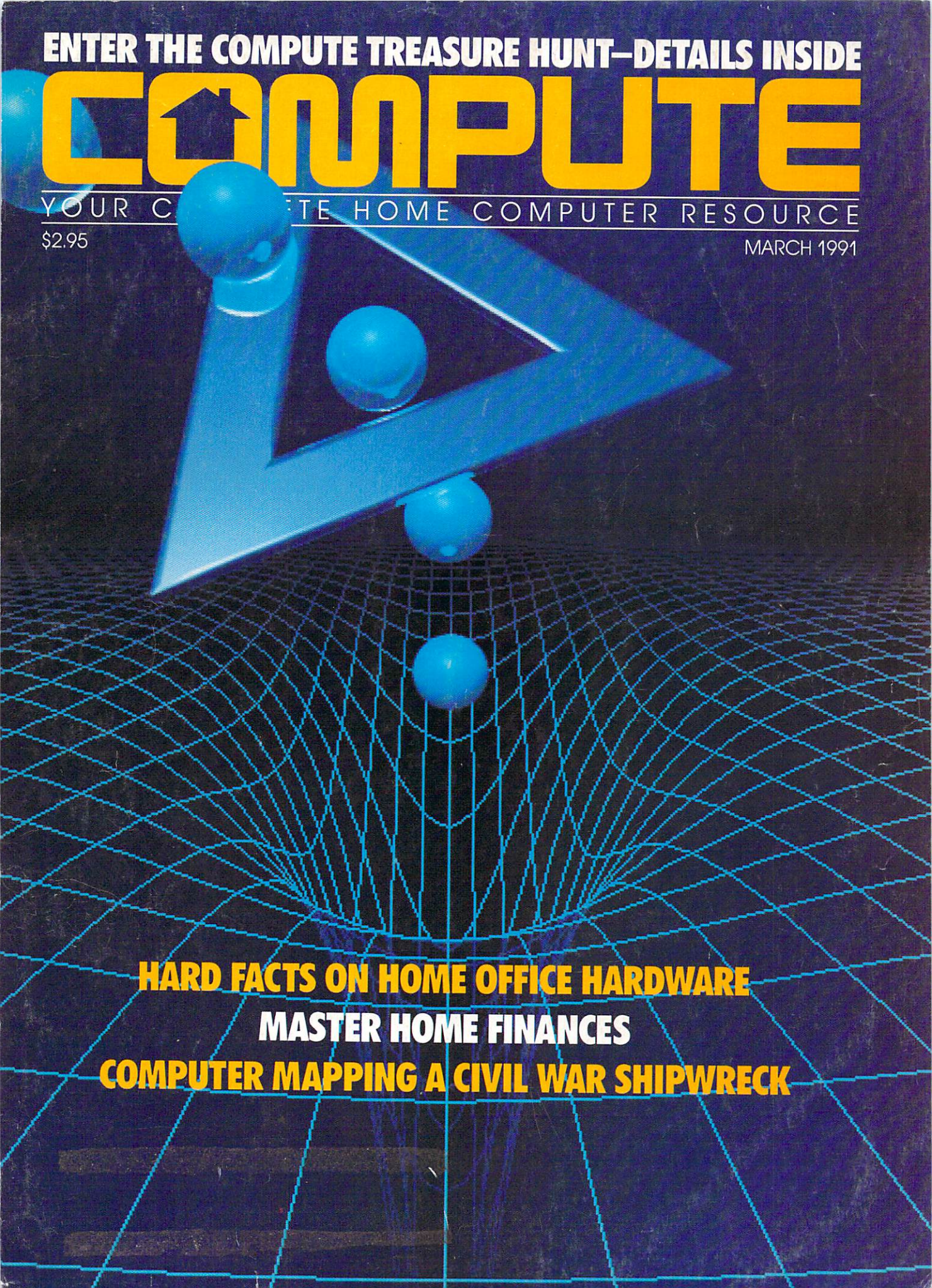


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MARCH 1991

VOLUME 13 • NO. 3 • ISSUE 127

GAZETTE SUBSCRIBER EDITION

Special Coverage Follows Page 88

FEATURES

So You Want to Be a Sysop? G-6

RICK LEMBRÉE
If you've ever called an electronic bulletin board, you may wonder what it takes to set up a system of your own. It takes time, effort, and sometimes money to become a systems operator (sysop), but an expert who should know says the rewards can be many.

DEPARTMENTS

64/128 View G-1

TOM NETSEL
More than 30,000 people attended the eighth-annual World of Commodore held late last year in Toronto. For us at COMPUTE, it was a great opportunity to meet with our Canadian readers and see some new products.

News & Notes G-4

EDITORS
A terminal program and a paint program are two new products that should appeal to 128 owners who have 80-column monitors. For 64 owners there's a new fantasy adventure game and software to help you prepare your 1990 federal income taxes.

Feedback G-16

READERS
Readers want to share information about older Commodore products, learn about starting an electronic bulletin board, and replace the chips in a 64 with faster ones. Another reader has supplied a handy update to our *Electronic Billboard* program.

COLUMNS

D'iversions G-19

FRED D'IGNAZIO
Technology in the near future will be everywhere, but it will also be invisible. It may be under your clothing, inside a tooth filling, or on the tip of your tongue. For heavy-duty computing, though, you can mount a mainframe unit as a chic dog or cat collar.

Beginner BASIC G-20

LARRY COTTON
BASIC is a wonderful language, but what would you like to do with it? Would you like to gather data? Control appliances? Play music? Learn to type? Time reactions? Dial a phone?



ILLUSTRATION BY DAVID CHEN

Machine Language G-22

JIM BUTTERFIELD
It seems pointless to have code that adds 0 to a number, or for that matter subtracts 0—after all, anything plus 0 gives an unchanged value. Yet there are times when it makes good sense. Here's a neat demonstration.

Programmer's Page G-24

RANDY THOMPSON
You stare at it all the time. BASIC's PRINT statement depends on it. Your software would be useless without it. Here are some tips designed to manipulate your computer's most visual component, the computer screen.

TYPE-IN PROGRAMS

Cross Aid G-25

LYSLE E. SHIELDS III
Many people enjoy spending time solving as well as making crossword puzzles, but finding the appropriate word is not always easy. A program such as *Cross Aid* can help.

Wired G-27

VICTOR BARBEE
On reconnaissance to a bleak and hazardous planet, you fall prey to the vile and loathsome Toiloots. You discover to your horror that the fiends have sabotaged your ship's wiring. The positive and negative terminals on all the circuits are clearly marked, but the connecting cables now resemble an upturned pot of spaghetti.

Termites G-31

GUS VAKALIS
Termites have infested Kelvin's four-story walkup, and the building is starting to collapse. Kelvin can escape this crushing fate if you help him jump over holes that appear in his path.

Graphics Converter G-34

GUSTAVO FELIX HERRERA
If you've ever wanted to use a *Print Master* graphic or a piece of clip art from *The Print Shop* with a GEOS document, then *Graphics Converter* is the conversion program for you.

Metallix G-37

RICHARD PENN
You can only have three colors per character with the 64's multicolor mode, but *Metallix* provides a new graphics mode that displays seven colors per character.



64/128 VIEW

T O M N E T S E L

Before I left for Toronto, I'd heard the World of Commodore held there each year is the biggest Commodore show in the world. So it wasn't too much of a surprise to find out that more than 30,000 people attended the eighth-annual show held late last year. For us at COMPUTE, it was a great opportunity to meet and chat with our Canadian readers, as well as the many American Commodore 64/128 and Amiga owners who crossed the border to attend.

The Hunter Group did an outstanding job organizing the show, signing up exhibitors, arranging for seminars, informing the public, and helping solve the myriad of problems that inevitably crop up at shows this size. Gordon Hunter, Karen Jewel, and the rest of the staff deserve thanks for all the fine work they do to make these shows run so smoothly.

Even the weather cooperated—for the most part. Neither rain nor snow impeded attendees this year as they made their ways to the Toronto International Centre. Some exhibitors had difficulty leaving after the three-day show closed, but more about that later.

Of course, not everything came off without a hitch. I arrived a day early to set up the COMPUTE booth. We had shipped computer books, disks, ball caps, and other items to sell, plus credit card forms, signs, pens, pencils, paper, tape, and other incidental items. They all arrived in good order and on time. There was only one thing missing. Well, actually it was more like 1500 things: our magazines.

We had shipped more than 1000 copies of the Gazette subscrip-

tion edition and 500 copies of the Amiga Resource edition, but they were nowhere to be found. There's nothing like being an exhibitor at a trade show with nothing to exhibit.

After making several telephone calls to Greensboro, New York, and points beyond, we finally located the missing magazines. Despite relaxed trade restrictions between Canada and the United States, we found the magazines had been delayed in customs. The Gazette subscription editions did arrive shortly after the show opened on Friday morning, and we finally had something to offer.

The Amiga Resource editions weren't quite so forthcoming. They were delayed longer but cleared just as the customs office closed for the weekend. We could pick them up first thing Monday morning. Since the show closed Sunday, that didn't do us much good.

As far as I know, the magazines

are still there. If you stop by a customs warehouse in Toronto, you might be able to pick up a copy of the November 1990 issue at a reasonable price. Better yet, tell the officials you're a friend of a COMPUTE editor, and he said you could have one free.

Things went a little smoother for most exhibitors, although new products for the 64 were in short supply. One exception was an exciting GEOS product on display at the Creative Micro Design (CMD) booth.

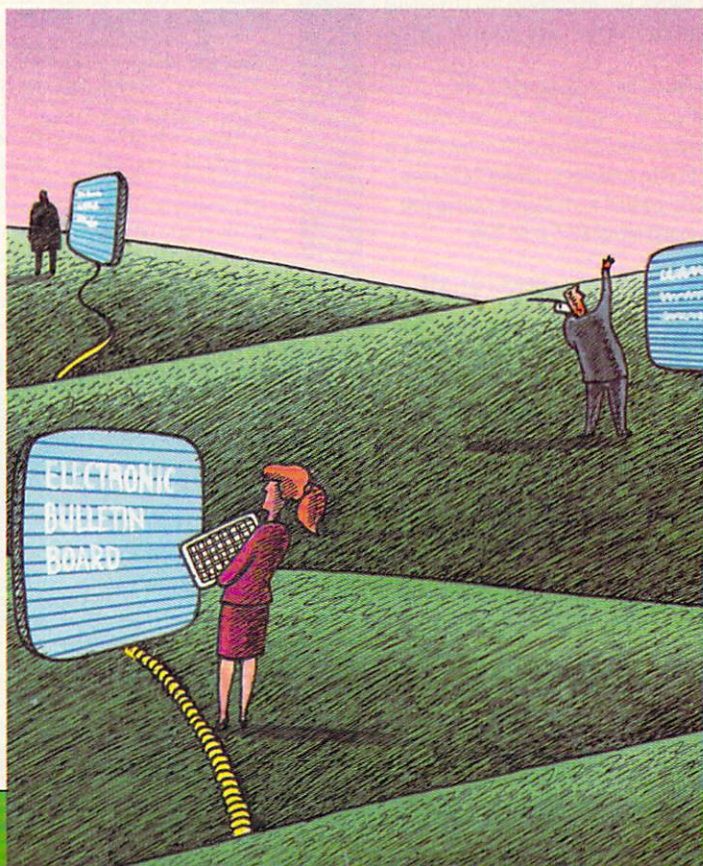
CMD is distributing a program called *gateWay*. It's an improved replacement for the GEOS desktop. Author Paul Bosacki was on hand to show off some of its features.

For one thing, *gateWay* offers full three-drive support with autoswapping for those applications that recognize only two drives. Now you can launch your favorite applications from drive C and copy to and from drive C without swapping drives.

Other big news at the show was Commodore's first showing to the public of its CDTV interactive compact disc system. CDTV combines audio, video, graphics, and computer interactivity into a single CD-based system that resembles a VCR or CD player.

CDTV had been shown to the press and trade at earlier shows, but this was the first time it was shown to the public. CDTV titles include games, reference material, sports and leisure topics, and self-improvement programs—and more are on the way. The system should be available by now, selling for less than \$1,000.

While there weren't many new 64 products, we still liked the show. □





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- Built-in two drive file copier. Supports all file types and drive types.
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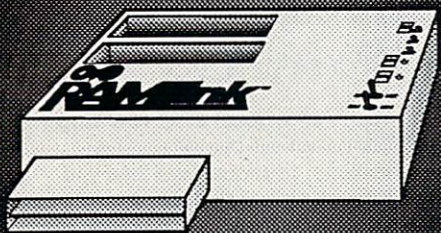
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- Supports Commodore 1700, 1764, 1750, Berkeley Softworks GEORAM and PPI's RAMDrive.
- Optional RAMCard allows RAMLink to be used as a RAM Disk with or without a separate REU. User Expandable from 1 Mb to 16 Mb using standard SIMMs.
- Pass-thru connector allows use of cartridge port peripherals such as utility cartridges.
- Reset, Disable, Direct Access mode and SWAP functions are all standard features.
- RAM port provides power back-up to REU's.
- Parallel port provides ultra-fast data transfer when connected to CMD HD series hard drives.
- Includes separate power supply - optional battery available to protect against power failure.

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RAMLink Battery back-up unit	\$24.95	Parallel Cable for CMD HD	\$14.95

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BOTH RAMLINK AND RAMDRIVE INCLUDE RL-DOS

- Allows vast amounts of commercial software, including GEOS, to access all available RAM as a high-performance RAM Disk.
- RL-DOS performs up to 20 times faster than Commodore RAMDOS, up to 400 times faster than a stock 1541 and provides full DOS command compatibility.
- Up to 32 1541/1571/1581 emulation or Native mode partitions, plus true subdirectories.
- Includes built-in JiffyDOS Kernel for high-speed access to JiffyDOS equipped disk drives.
- Software for copying files (FCOPY) and complete disks (MCOPY) included.
- Many other features, including CMD's exclusive device number SWAP functions.

WHICH ONE IS RIGHT FOR YOU?

Both RAMLink and RAMDrive give Commodore users powerful features never before available in a RAM expander. RAMDrive is intended mainly for those who do not require the high RAM capacity of RAMLink (up to 16 Mb), RAMLink's Pass-Thru port or the parallel port for communicating with the CMD HD Series of hard drives. RAMDrive is an excellent choice for those who desire portability since the internal battery pack can keep the contents of RAMDrive intact for several days. RAMLink is the perfect choice for geoRAM owners who want the ability to use that device with programs other than GEOS. RAMLink has a built-in RAM port for easy use with a geoRAM or Commodore REU. No matter which CMD RAM device you select, you'll benefit from fantastic capabilities of having a high speed RAMDisk equipped with RL-DOS and the outstanding value of CMD support.

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RAMDrive is a fresh new approach to RAM expansion for the Commodore 64 and 128. RAMDrive is a self contained battery backed cartridge with capacities of 512K, 1 Mb and 2 Mb. RAMDrive incorporates RL-DOS, an ultra-fast, easy-to-use operating system similar to the HD-DOS found in CMD HD series hard drives. This proprietary DOS allows various types of partitioning along with compatibility and speed unsurpassed by previous RAM Expansion systems.

- Compatible with vast amounts of commercial software as an ultra-fast RAM disk.
- RL-DOS operates up to 20 times faster than Commodore's RAMDOS.
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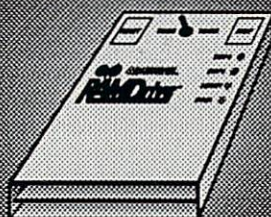
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NEWS & NOTES

Only Two Things Are Certain

It's almost the time of year again when Uncle Sam asks for his piece of your financial pie. Paying your taxes is never easy, but the people at Taxaid Software (800 Middle Road, La Pointe, Wisconsin 54850; 715-747-5862) can make filling out the tax forms a little easier. *Taxaid* (\$49.95), designed for home use, was written by experienced tax accountants and thoroughly tested.

The latest edition of *Taxaid* includes all the current changes in the tax laws for the 1990 tax year. Included are IRS Form 1040; Schedules A, B, C, D, E, and SE; and Form 2441 (Child Care). Calculations are automatic, and all tax tables are built in.

Forms are printed in IRS-approved plain-paper format and can be submitted exactly as they come off your printer. Updates for 1991 will be available for \$18.

Rescue the Princess

You're on a quest to rid your kingdom of an evil demon and his minions. Your quest will lead you through caves, swamps, temples, and castles as you attempt to rescue the lovely princess.

Wrath of the Demon (\$39.95) from ReadySoft (30 Wertheim Court, Unit 2, Richmond Hill, Ontario, Canada L4B 1B9; 416-731-4175) features three megabytes of graphics data, 600 screens of action, and more than 1400 frames of animation.

80-Column Dialogue

If you have a 128 or 128D with an 80-column display, *Dialogue 128* (\$49.95) is advanced terminal communications software that's available from Shining Star Software (#1205-1640 Bayview Avenue, Toronto, Ontario, Canada M4G 4E9).

This terminal program supports 64K video RAM, REUs, all disk drives, burst mode, partitions, joysticks, trackballs, mouse and all serial bus interfaced printers. It also supports CompuServe Quick B, Punter C1, Xmodem checksum, Xmodem CRC, Xmodem 1K, and YModem Batch protocols.

Dialogue 128 also has a 64,000-character capture buffer and a 9,000-character scrollbar review buffer. An autoexecute script language allows unattended and automated operation. All commands are available through hot keys or drop-down menus. The program also supports most popular modems.



Hatteras

Hatteras by Robert Woodall of Rural Hall, North Carolina, is this disk's Picture of the Month.

Welcome to "Gazette Gallery." Each month *Gazette Disk* features a collection of the best 64/128 artwork submitted by our readers. We pay \$50 for each piece of art we accept and an extra \$50 for the one selected as Picture of the Month. Send your original artwork to Gazette Gallery, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □

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C-128D w/Built-in Disk Drive
Includes 1 FREE Game
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MODEL 8702

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DISK DRIVE

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MAGNAVOX 13" COLOR
RGB/COMPOSITE MONITOR

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COMMODORE 1084
MONITOR

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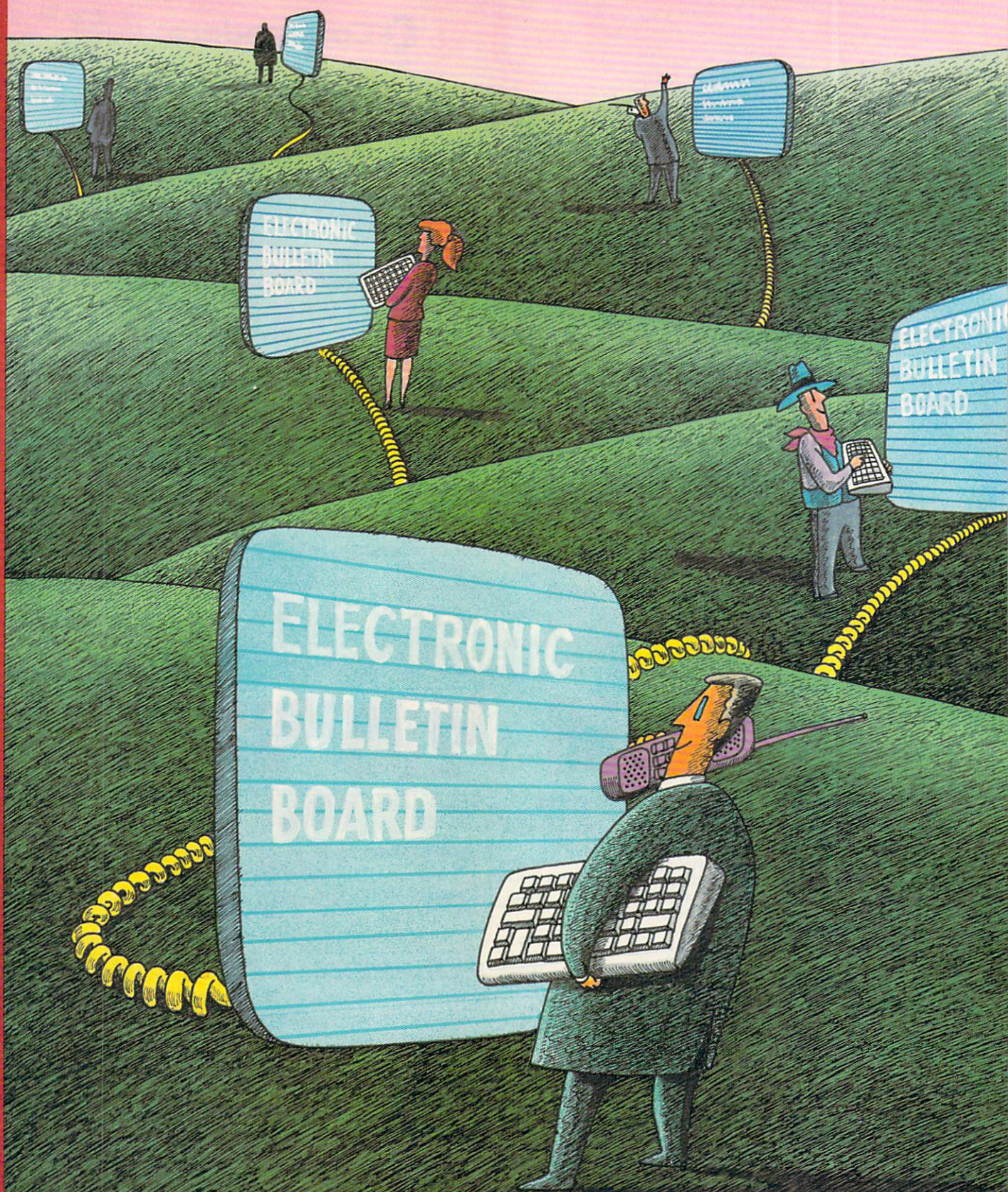
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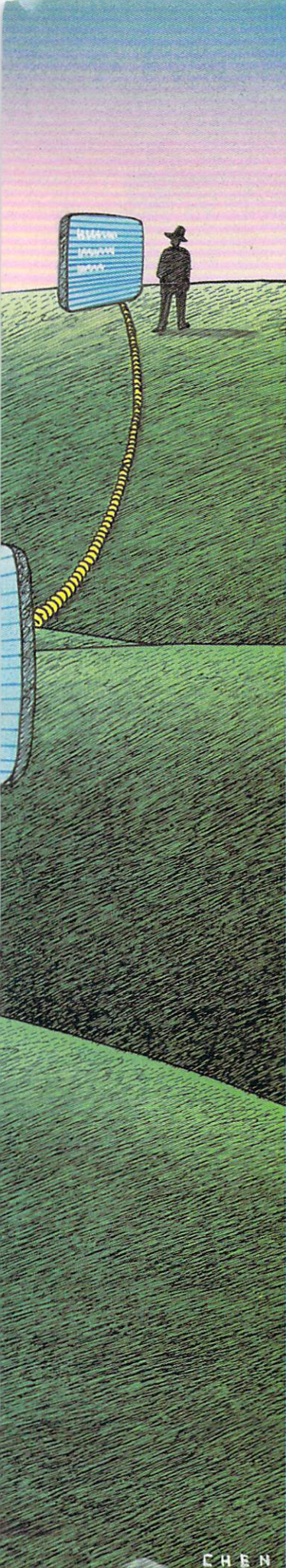
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SOME ADVICE
FROM AN EXPERT

Many computer users who call electronic bulletin boards often wonder what it would take to operate their own systems. It takes time, effort, and sometimes money to become a systems operator (sysop), but the rewards can be many. We'll take a look at what it takes to run your own bulletin board system (BBS). ▸

DAVID CHEN

R I C K L E M B R É E

With your computer and a modem, a device that transmits and receives computer signals by telephone, you can call practically any BBS in the country or world for the price of the phone call (see "How to Access a BBS"). Most BBS callers enjoy reading messages from other callers and posting their own comments and questions. They also like to download the free software and play the online games many boards offer. It's easy to understand a BBS's appeal, but what enjoyment does the sysop derive from having his or her computer and telephone tied up for the benefit of others?

With your own BBS, you can literally speak to the computing world via your own little soapbox. You can use it to exchange programs and files, to voice your opinion, or to create your own fantasy world. I've seen some BBSs that are operated like an adventure game, where the users are citizens of a fantasy kingdom. A BBS is merely a form of communication between you, the sysop, and the users. Bear in mind the importance of interaction between users. Without that, you will not have a successful BBS. The spirit of a BBS is in the sharing of knowledge among fellow computer enthusiasts. As in a conversation, both parties must contribute for a bulletin board to be successful.

The First Steps

In this article, I'll attempt to instruct the neophyte sysop on the ins and outs of starting his or her own BBS, describing the minimum requirements for a system run on a 64 and those for a larger 128 system. Before you attempt to start a BBS, however, I can't emphasize enough the importance of joining a user group. A user group is a great place to obtain help with a project like this, and it will most likely have several public domain (PD) or shareware BBS programs available for you to try at little or no cost.

If your user group runs a BBS, you may want to get involved with it to get your feet wet before attempting to start your own. In addition, once you've set up a BBS, you'll want a ready supply of PD software to make available to your callers. A user group is a great place to obtain good PD software.

Before you set up your BBS, ask yourself what you want it to do. Do you want it to be your own private BBS that only your friends can access, or will it be open to the public with restricted or unrestricted use? My suggestion is to do as I did in 1984: Start small and allow only friends online at first. Don't release the telephone num-



Here are sample menus from three bulletin boards available for the 64 (clockwise from upper left): Dragonfire BBS, ARB BBS, and DMBBS.

ber to the public. This way, you can see if you are sysop material. It's also a good way to test how your system will perform on your voice phone before you make a decision to go public and possibly spend money on a separate telephone line. I'll discuss that in further detail later.

Do You Know What Time It Is?

A few words of caution if you do decide to run a board on your only home phone. Do so only during the times you aren't expecting voice calls. Make it a part-time BBS, and don't give your number to the public. Once you've released your number, if you decide that you don't want to be a sysop or if you change to a full-time system on another telephone line, you're liable to be plagued with calls on your voice telephone line at three in the morning. You'll answer the phone only to hear a computer on the other end. I made that mistake in 1984, and I still get calls.

If you do decide to go public, get another phone line and use that one for your BBS. The initial installation may be expensive, but it's worth not having the aggravation of answering your voice line only to have your ear blasted with the high-pitched sound of a caller's modem. The monthly phone bill will be minimal if you have basic

service only. If you can persuade your callers to voluntarily contribute a few dollars, the system could possibly pay for itself.

Some sysops ask for donations to help with the monthly expenses, but don't dive into a BBS with the notion that you will make money. You won't. It's as simple as that. Operating a BBS is a hobby, and trying to make a buck off your users is unrealistic and unfair to them. No one is going to throw money at you for a BBS. People will pay for online services such as QuantumLink, but not for a BBS.

Bare Bones

The second thing to consider is what you'll need in the way of hardware. You can start out with a small but adequate system, consisting of a 64, one disk drive, a monitor, a 300-bps modem, and an optional printer. While you probably already have this much equipment, it would limit the size of the message bases and files available for uploading and downloading. It would, however, give you the experience you need without draining your wallet. Most 64 owners considering a BBS have what is required with the exception of the appropriate software.

Let's discuss bare bones for a second. With a basic system, even with an extra disk drive, you'll be limited

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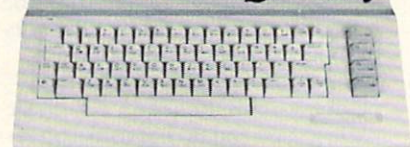
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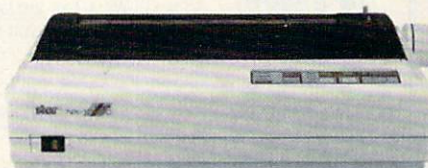
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Circle Reader Service Number 123

continued from page G-8

to a small message base and be forced to swap numerous disks to give your users a decent selection of software to download. On my first system, I simply changed disks every day, and my users had to take what was available on a given day.

Uploads are a different story. You want users to upload programs that you can share with other callers, but too many uploads can pose a problem. Users can easily crash a small system like this if they fill your disk space with multiple uploads before you have a chance to change disks. You must constantly watch and tend a small system, or you'll be inviting trouble.

The ideal system would be a 64 or 128 with a 2400-bps modem. Some 8-bit systems use modems with higher baud rates, but there are two reasons to stick to a maximum of 2400 baud. First, few if any software packages for the 64 or 128 support higher baud rates, and these computers have difficulty communicating at speeds above 2400 bps. Second, if your callers are mainly other Commodore users, it's unlikely that they'll be using higher baud rates. So a 4800- or 9600-baud modem is not cost efficient.

Other items in the ideal system

include a high-speed dot-matrix printer and a 20-megabyte or larger hard disk drive. A complete system can be had for under \$1,000 if you can find a good used one. Even new, \$1,500 is a reasonable startup price.

Bigger Is Better

Let's take a quick look at a large system. A large system with a 20MB hard drive is easy to maintain, needs little attention, and can store a vast amount of software for your users as well as yourself. Multiple message bases are possible, online games are a snap, and the sheer speed of a hard drive compared to the sluggish 1541 makes using the system a pleasure.

My last system before changing to my Amiga 2000 was a 128 with a 20MB hard drive. The drive, Xetec's Lt. Kernal, communicated with the computer via a parallel bus instead of a serial bus. My users were amazed at the change in speed between the hard drive and the 1541. If you're serious about a BBS and can afford it, I suggest you get a hard drive. The new hard drives from Creative Micro Design are a bit slower, but the advantage is total CBM-DOS compatibility.

This Board's for You

As for software, call other bulletin

boards to see what they are running. If you find a particular BBS you like, ask the sysop what he or she is using. Most sysops are happy to direct you to a good source of software, whether it's PD, shareware, or commercial.

Before you buy commercial BBS software, send away for literature describing the capabilities of the program. There is nothing worse than plunking down money for a software package you end up not using. So research what you want carefully. Try to find one that is reliable—that is, one that's not prone to frequent crashes. (See "BBS Software" for my recommendations.)

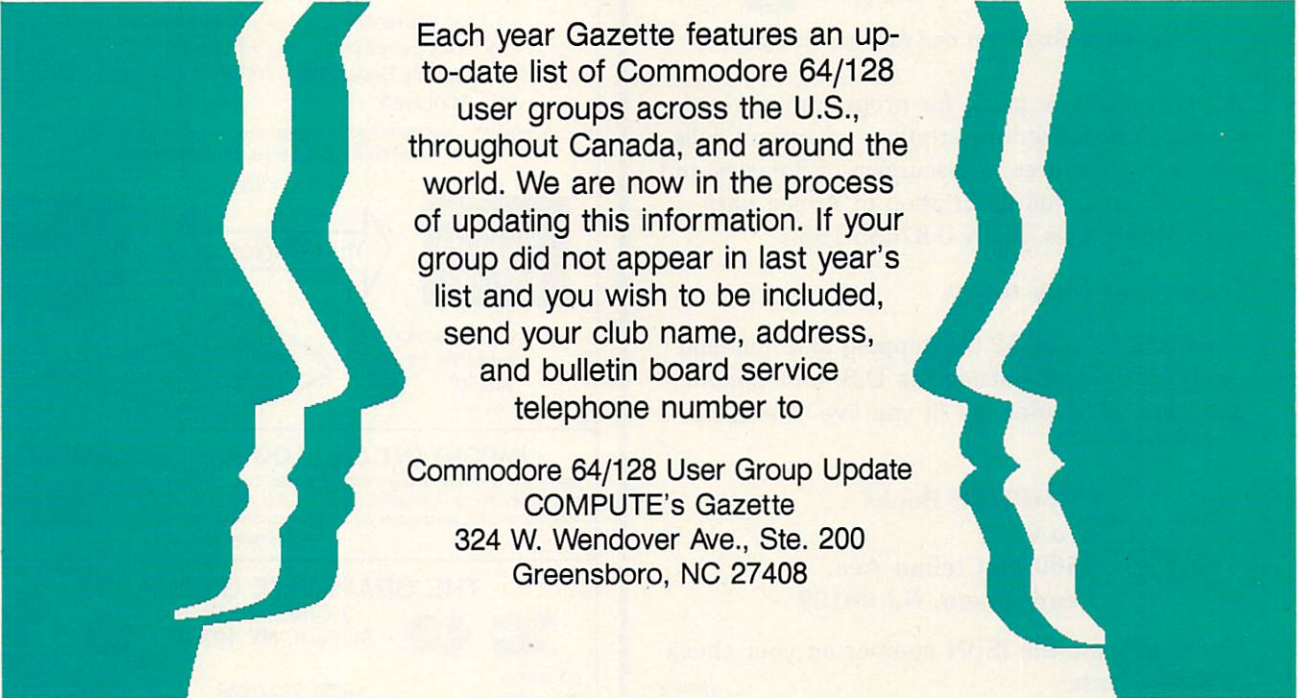
Now that you have the hardware and software to get your BBS up and running, you have to make it work. I can't go into specifics of every possible configuration, but I will touch on a few points I've learned along the way. Start out by considering your BBS's primary purpose. Will it be a system where only messages are exchanged, a file-exchange system, or both? Do you want to have online games; if so, does your software support them?

You'll definitely benefit by sitting down with paper and pencil to map the layout of your BBS, its menu structure according to the documenta-

continued on page G-13

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Each year Gazette features an up-to-date list of Commodore 64/128 user groups across the U.S., throughout Canada, and around the world. We are now in the process of updating this information. If your group did not appear in last year's list and you wish to be included, send your club name, address, and bulletin board service telephone number to

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How to Access a BBS

To access a BBS, you must have a modem (MODulator-DEMulator). This is a piece of hardware that enables your computer to communicate with another via telephone lines. A good modem to purchase is one that will operate at a high speed or baud rate. *Bits per second (BPS)* is a more accurate term.

You'll also need terminal software to let your computer communicate with your modem. Rather than going into specifics of how to use a terminal, I strongly suggest that you read the program's manual or documentation. It's vital that you understand how and why a terminal works before you go online. If you simply don't understand what it's all about, contact someone in your local user group for help.

Accessing a local BBS is relatively simple, and it doesn't have to be a Commodore BBS. You can access one running on an IBM, Atari, or any other computer.

Load your terminal software and configure it to 8-bit ASCII mode, no parity, and one stop bit. There's usually a menu option that lets you set these parameters. Most BBS's operate on this standard, and you should have no trouble connecting. It's unusual to find one operating at 7-bit, even parity, and two stop bits, but they exist. Make sure that you are set for the correct baud rate (BPS) for the board you're call

ing. Most boards can handle speeds between 300 and 2400 baud.

If you don't know of any BBS's in your area, contact your user group or local computer dealer. If you can get just one number, you're on your way to finding others. Most BBS's have a good list of local, state, national, and sometimes international BBS's.

Once you've made your connection, you may have to hit Return or Enter a few times to "wake up" the BBS. Once you're in, you'll probably see a message welcoming you to the board. At that point, it may ask for your name and password or for you to type *New* if you're a new caller. From there, follow the instructions.

Once you've gained access to a new BBS, read what appears on your screen. Most BBS's offer clear instructions for what to do next, but new users often are intimidated and fail to comprehend what they're reading. Take a deep breath, read, and try to comprehend before you panic.

You'll probably have limited or no access on your first call, and you may have to register. This involves filling out some sort of online registration form. Occasionally, you may get instant access to the BBS and its numerous features, but this is the exception rather than the rule. You'll more than likely have to wait a day or

two and call back after the sysop processes your application.

Some systems require a fee to access. I often find that a BBS that requires a fee is not worth the money. BBS's really worth calling are the ones that are free and for which fees are voluntary.

Once you have access, go to and read the help files; otherwise, you'll be lost. Try to capture them in your terminal software's buffer to print out and read later. This is your map to the BBS and will facilitate your moving around the system. Not only will help files save you time and make it easier for you to find your way through a strange BBS, but these files also usually explain many of the board's special features that can make your visit more fun.

Try reading and leaving messages. Peruse the available files and download (receive) an interesting program or file. If you need help, try paging the sysop. If available, he or she may come online with you in chat mode.

The rest is really just exploring the system and getting to know it. Some may offer online games for one or more callers. Other boards have multiple telephone lines that allow several callers to chat live with each other. Each one is different. Check out the menus to see what's offered and don't forget to read the help files.

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tion, and the possible combinations of message bases and transfer sections you intend to have. This is a great timesaver and will save you headaches down the road when you want to reconfigure your setup. Design your menus carefully, if your bulletin board software has that capability.

Know the Password

Before you start your BBS, you should decide whether to make the system open to all callers or require that callers be verified and use a password for access. As a sysop, I want to know who's calling my BBS, even if I let people use fictitious names or handles online. I also strongly suggest using passwords. They'll cut down on the number of hackers trying to crash your board and ensure the privacy of your users' messages and electronic mail.

If you're fussy, you can verify all potential users by making them supply their correct names and addresses by mail. Some sysops ask for a photocopy of a driver's license as proof of a caller's identification. On the other hand, you can simply screen applications for suspicious names and addresses, such as John Doe or 12345 USA Street. I don't usually permit callers full access to my board unless

the information they supply is complete and accurate.

If I happen to be at my computer when someone new calls my BBS and registers online, I often get on my voice phone and call the number listed on the application while the caller is still connected. That number should

be busy when I call. If it's not, I get suspicious and investigate further.

No Hogs, Please

I suggest you limit your callers to 45 minutes per call and two or three calls per day. If you give everyone unlimited time, you'll find some users abuse the privilege and hog the line so others cannot use the BBS. The same holds true for downloading privileges. Don't give too much, or it will discourage other callers who constantly get a busy signal because someone is downloading program after program.

This includes you. If you hog the system by playing games, people trying to connect will get frustrated. If you want to use your computer for personal use, do so only during slow periods or, in the case of a part-time BBS, during the board's off hours; or buy another computer.

Callers can get discouraged with a BBS if it's difficult to connect, and sysops can get discouraged if people don't call. Don't expect your BBS to overflow with callers the minute you put it online. If you decide to go public, advertise your board's number on other BBSs; make leaflets with *The PrintShop*, *PrintMaster*, or a similar package; and distribute copies to bookstores, computer stores, schools, and libraries. During summer months especially, expect a slowdown in log-ons. Not too many people sit at home calling a BBS on a bright summer day; don't let it discourage you.

Other things can get on your nerves as a sysop. These include users' not obeying rules you've established and asking you questions that are plainly explained on the board. Those who simply disconnect instead of properly logging off and who complain because your system doesn't meet their expectations are other examples of callers a sysop can do without.

If you're willing to put up with these relatively minor aggravations, you may be sysop material, especially when you begin to reap the fruits of running a BBS. You'll learn more about computers, have PD and shareware software uploaded to you, communicate with people from all over. Best of all, you don't have to call out; people call you. In closing, the best rewards for me in running a BBS since 1984 are all the appreciative users I've met. They've become more than callers; they've become good friends. ☐

Rick Lembrée is the CEO of Harbour Lights Communications, a desktop publishing firm; chief sysop of Harbour Lights BBS, the oldest continuously operating BBS in Maine; chairman of Southern Maine Commodore User Group; and editor of its newsletter, *C-Link*.



BBS Software

To set up your own electronic bulletin board system, you'll need the proper software, whether it's commercial or public domain. Public domain software and shareware are available through your user group or can be downloaded from many bulletin boards, including my BBS, Harbour Lights, at (207) 967-3719. If you use shareware, please send in your registration fee to the author. Here are a few available titles: *EBBS 64*, *EBBS 128*, *RIBIT BBS*, *All American BBS*, *64 Messenger BBS*, *Star BBS*.

Here's a sample of some of the commercial BBS programs available for the 64 or 128. *ARB BBS* gets my vote as being one of the better bulletin board programs available. It supports multiple message bases, X-Modem and Punter protocols, story boards, multiple levels, online games, E-Mail, and more. Its manufacturer, L & S Computers, also offers good support. But all those listed here are sure to get you off on the right foot.

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Yodahead Software
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Dynamically Modifiable Bulletin Board System (DMBBS)
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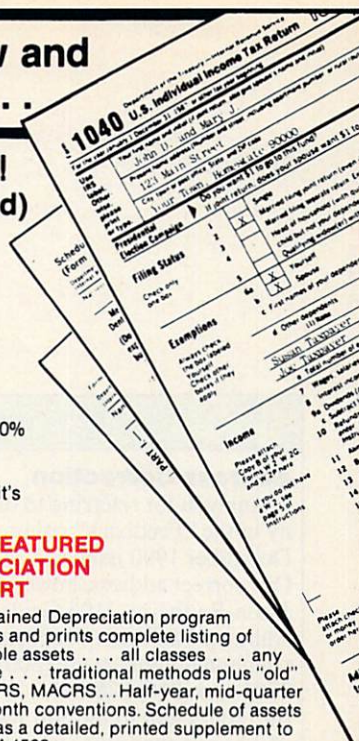
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FEEDBACK

EDITORS AND READERS

Address Correction

Thank you for referring to our company in the "Feedback" column of the December 1990 issue of *COMPUTE*. Our correct address, however, is Jason-Ranheim, 3105 Gayle Lane, Auburn, California 95603; and our telephone numbers are (800) 421-7731 and (916) 878-0785. We fear that the letters sent to the San Jose address will be returned since we moved from that address some years ago.

JUDITH HANSON
MARKETING DEPT.
JASON-RANHEIM
AUBURN, CA

Our apologies to Jason-Ranheim and any readers who may have written for EPROM information to the old address we mistakenly provided.

Keep It Clean

I followed the instructions for cleaning my keyboard as you suggested in "Feedback" (November 1989), but now I'm having problems with it again. Some keys require excessive pressure to work, while others print double characters at the slightest touch. According to a discussion on our local bulletin board, cleaning may not solve the problem. Some people say a little piece of rubber that bridges the switch gap between the key and metal contacts on a printed circuit board may be wearing out. I would appreciate your comments.

JOSEPH J. KNUEVEN
WYOMING, OH

The "Feedback" you referred to essentially recommends the use of compressed air, a pencil eraser, and rubbing alcohol. Alcohol is a great cleaner providing it's ethyl alcohol. A Commodore repair person we contacted, who has corrected this particular problem many times, says dirty contacts are usually the culprit for the majority of keyboard ailments and that a cleaning is called for. Using alcohol isn't always necessary, however. Instead, use a pencil eraser to clean the metal contacts; then score the connec-

tor, which is plastic rather than rubber, with a small wire brush.

Back to the Board

I was very pleased with the *Electronic Billboard* program (June 1990), but I have one problem. My word processor won't save files in the proper Commodore ASCII format for the program to read from disk. I decided to modify the program to write to disk the 99 lines the user can enter directly from option 2 on the *Billboard* menu. The program can then load the text into memory with the load routine from option 1.

First, load *Billboard.Bas* and type in the lines listed below. Remember to save the program when you've finished. To use this routine from the main menu, select option 2 from the main menu and enter the lines of your message in the usual way. When you've finished, type an asterisk (*) on the last line as you normally would. Then press S at the prompt, and the message will be saved to disk automatically as "BILLBOARD.DATA." Later, when you want to load this file from disk, select option 1 from the main menu. Lines 1100 and 1110 are simply disk error-checking routine from the 1541's user manual.

MIKE TENNANT
WASHINGTON, PA

```
CH 130 DIMS1$(MX),S2$(MX),L$(9
9):R1$="{RVS}":R2$="{
{OFF}":S1$=SP*3:S2$=SP*
5-5
RX 200 PRINT "{DOWN} PRESS RETU
RN TO START MESSAGE SCR
OLL"
HR 205 PRINT "{SHIFT-SPACE}ENTE
R S TO SAVE MESSAGE":PR
INT "PRESS Q TO QUIT";
PF 210 CH$="":INPUTCH$:IFCH$="
Q" OR CH$="Q" THEN SYS2
048:END
XF 215 IFCH$="S"ORCH$="S"THEN
{SPACE}GOSUB1000:GOTO20
0
RG 300 POKE214,23:PRINT:PRINTS
P$;:POKE214,23:PRINT:PR
INTB$;:SYS828
XE 570 S1$(N)=CS:L$(N)=CS:
{6 SPACES}IFS1$(N)="-"T
```

HENGOTO440

```
PJ 1000 OPEN15,8,15:GOSUB1100
AH 1010 OPEN2,8,2,"0:BILLBOARD
.DATA,S,W":GOSUB1100
XC 1020 FORZ=1TON-1:PRINT#2,L$
(Z):NEXT:GOSUB1100
GG 1030 CLOSE2:GOSUB1100:CLOSE
15:PRINT"SAVED.":RETUR
N
QH 1100 INPUT#15,EN,EMS,ET,ES:
IFEN>1THENPRINTEN,EMS,
ET,ES:STOP
CE 1110 RETURN
```

A Charitable Offer

As a former treasurer of the church I attend, I have developed Commodore 64 programs to manage the finances of the church and make periodic reports to the governing body and congregation. I converted some of these programs for use on a PC owned by the church, and they are still in use. I would be happy to share either the 64 or the PC version of these programs with any church or other charitable organization that would care to contact me.

WALTER L. JOHNSON
515 SE NOLAN ST.
DEKALB, TX 75559

My Own BBS?

Last year you ran an article that talked about people running their own BBSs (Bulletin Board Systems). That sounded interesting, but I have a lot of questions to ask. How could I run my own BBS? Does it cost a fortune? Does it tie up the phone lines?

If I couldn't run my own, could you tell me how to become a member of someone else's BBS? I heard you need certain things such as a BBS program. Could you tell me how to get one?

TIM HEALY
RAYMOND, NH

You picked a good time to write, Tim. In this issue, Rick Lembreé, who's been operating his BBS in Maine since 1984, shares his expertise with our readers. If you already have a 64 and a modem, you have all the hardware you need for a small system. You will need a BBS

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program, but check the article for further information about this interesting computer activity.

A Reader Helps

A couple of letters in the January 1991 "Feedback" are worth mentioning. John Potter asked about disabling the programmed function keys on his 128. Here's an easy way. Poke 828, 183 to get the 64 values; then poke 828, 173 to reenable the 128 definitions.

Walter Stegemiller asked about delays in programs that use extensive arrays. Creating simple variables, such as A or B\$, after the arrays are DIMensioned is the usual cause for one-time delays. Each new variable causes a delay.

To avoid this, preassign all simple variables using a DIM statement, such as DIM A, B\$, X, Y, Z, before creating the array. Also, the notorious *garbage collection* delay occurs only when using strings. This might help Walter isolate the cause of the delays in his programs.

BOB RENAUD
WASHINGTON, MA

Thanks for the tips, Bob.

Stars for Sale

I am 72 years old with vision only in one eye, so I like ready-to-run programs on disk. You have one in the June 1990 *Gazette* called *Starburst Graphics* that I would like to use for camcorder graphics. Is there any chance you will have this on sale soon?

RICH MAUNEY
MT. HOLLY, NC

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FEEDBACK continued from G-17

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PET Vets

Your magazine is informative when it comes to the 64, but once in a while it would be fun and interesting to read an article about the old datasette, 1520 plotter, and my old Commodore 16 computer. I am sure there is more than a minority of dedicated Commodore owners who would enjoy taking this old hardware down from the attic, dusting it off, and exploring its capabilities again. Where else can we get information on this old hardware? They haven't written a book on an-

tique computers yet, but maybe there's someone with ideas on how to expand their use despite the newer PCs.

DENNIS KOZIK
WEST ISLIP, NY

Perhaps you and other Commodore veterans might want to contact the writer of this next letter. You might also try your local user's group.

If anyone out there is a fellow Commodore collector or user of older Commodores (PET, VIC-20, Plus/4, C16, or B128), write me. Let's share information on software, hardware, and other resources before they become nonexistent.

LARRY ANDERSON
547 LEWIS ST. #14
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Who's Got the Ribbon?

I was reading your "Feedback" column in December, and I was able to help out someone with the Tech Sketch light pen. Now I hope someone can help me find a ribbon for my Okidata 10 printer. I sent an order to the Okidata supply address, and the postal service returned my letter, stating that Okidata was no longer there.

Should I have to discard my printer because I can't find ribbons?

DOROTHY REYES
HOLLIS, NY

We don't know what address you used to order your ribbon, but when we contacted Okidata, a spokesperson said the company is still very much in business and offered the following advice. Contact Okidata and someone will either direct you to a dealer near you who stocks the ribbons or else arrange to have one sent to you by mail. Write to Okidata, Customer Service, 532 Fellowship Road, Mount Laurel, New Jersey 08054. Okidata ribbons are also available through Ramco Computer Supplies, P.O. Box 475, Manteno, Illinois 60950; (800) 522-6922. A black ribbon from Ramco sells for \$5.25, a color one for \$5.75. You might also try contacting a local computer store.

If you have a question, comment, or problem, we want to hear from you. Send your letters to Gazette Feedback, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.



D'IVERSIONS

F R E D D ' I G N A Z I O

Recently I attended the Consumer Electronics Show in Chicago, previewing new computers. I passed by the Sharp Electronics booth and was struck by its line of pastel-colored products. There were juicy peach TVs, baby blue calculators, lime green radios, and shocking pink boom boxes. I also noticed that the products' cases didn't have sharp right angles with well-defined corners. Instead the cases were contoured, their corners rounded, smooth, and soft-looking. The products looked less like an engineer's chassis but more like something organic and alive. It was all high-tech designer chic—something with a decidedly human look and feel.

The "in" look now in southern California is clothes that haven't seen the inside of a washer or the underbelly of an iron. Beards, legs, and underarms that haven't been shaved and unwashed hair that has a stiff, greasy, "sexy" look are also fashionable.

Rumpled is in. People are rumpled. Clothing is rumpled. Technology with a rumpled look is next.

Rampant miniaturization and "digital fusion" will help rumple technology and give it a much more human look and feel. Appliances will fuse: cameras, VCRs, and TVs; telephones, fax machines, laser copiers, and answering machines; computers, radios, TVs, CD players, CD-ROMs, and laser discs.

If technology continues to shrink and converge, then it will become possible for appliance and clothes designers to work closely together to design intelligent clothing in which the appliances are housed. If high-tech becomes microminiaturized, just think of all the computing power you will be able to fit inside a woman's shoulder pads, a Texan's cowboy hat, or a teenager's pump tennis shoes.

Whole entertainment centers will travel with us. We'll wear them as microspeaker earrings, laser disc neckties, and CD-ROM belts. We'll carry entire libraries as encyclopedia suspenders, fax machine necklaces, and

data-dump jumpsuits.

It won't stop there. In the future when high-tech is built into our clothes, even our underwear will be intelligent. Undershirts will have body sensors and release deodorant as needed. Undergarments will have environmental-control panels that will keep us toasty warm on cold days and frosty cool during the dog days of summer. Our underwear will be multitasking. While it keeps us from

NEXT CENTURY'S HOT ITEM: HIGH TECH TO GO

being socially suspicious, it may also be working on a tough engineering problem, sorting out a personalized newspaper, calculating our taxes, or designing a challenging videogame for us to play when we get home at night.

At the end of the 1990s, we'll look back at our desktop computers, and marvel. "How could a computer be so big?" we'll say, shaking our heads. "And look at it. It just sits there, all blocky, square, and squat."

The term *desktop computing* will become a quaint term that carries the same nostalgia as hula hoops, tail fins, Howdy Doody, or Bing Crosby.

Nobody will be doing desktop computing because the desktop computer will have disappeared. In rare cases where a megamainframe is required, the computer will have disappeared into the desk. In all other cases, we'll wear all the computing power we need in our different outfits.

Getting dressed in the morning

will be a hard thing to do—especially when we are naked and don't have any onboard computing power. "Do I want to feel really intelligent today and wear my 20-gigabyte sport coat, or do I feel lowbrow enough to get by with my old 100-meg T-shirt?"

In the future, everyone will wear glasses. The glasses will "correct" our vision from real-world reality to a virtual reality that has a computer-display screen overlaid on top.

When we need to access information at school, at work, or in a meeting, we'll reach into our pockets and pull on pairs of sunglasses. In most cases we'll see facts, figures, pictures, simulations, and so on; but we might secretly be looking at digital movies, controlling a CD player embedded in our earrings, or playing videogames using our eye movements to control optical joysticks.

Technology clothing can be pretty flashy, but it's only a waystation to the real high-tech look of the next century. By the year 2001, many trendsetters will have abandoned clunky high-tech clothing for the new look: technology embedded in your body. After all, what are people to do on the beach in skimpy bathing suits? Or in the shower, or in bed?

We can take our technology with us, but it'll soon be a bother to wear all-terrain technology "wetsuits" that can go anywhere. Instead, people in the know will be carrying all their appliances as *dermal implants* inside their bodies. And it will be a gas! Imagine pressing your belly button to call your mom, who is vacationing in some renovated gulag, or closing your eyes and watching the new Rocky movie (*Rocky XXV*).

Technology in the near future will be everywhere, but it will also be invisible. It may be under your clothing, inside a tooth filling, or on the tip of your tongue. For heavy-duty computing, though, you can mount a mainframe unit as a collar around the neck of your favorite pet. And if you're smart, you'll get a really intelligent collar that will also kill fleas. □



BEGINNER BASIC

L A R R Y C O T T O N

For many computer users, the first time they encounter BASIC is when they turn on their machines. On the 64 or 128, the first screen you see is a BASIC screen. The computer attempts to interpret anything typed on the keyboard as a BASIC command.

If you type your name and press Return, the computer will look it up in its internal BASIC dictionary. And unless your name happens to be LIST or another BASIC keyword, the computer will announce that you've entered a syntax error; your name wasn't in its BASIC interpreter.

The 64's version of BASIC is similar to the original BASIC invented at Dartmouth College almost 30 years ago. The 128's version contains all of the 64's commands and adds many of its own, such as RDOT and SPRDEF. Since these commands are unique to the 128, we won't spend much time on them in this column; I have to cover what's common to both computers.

There's been a lot of press—mostly bad—about BASIC's speed. There's no doubt about it; BASIC is slow. Every instruction the computer sees in a program must be translated just as if it had never seen it before. If you say PRINT X+Y, the computer must first look up PRINT to see if it's a valid BASIC statement, then look up the value of X, and then check to see if the + sign really means anything. It then looks up the value of Y, does the addition, and prints the result on the screen.

If you say PRINT A-B, the computer doesn't remember that PRINT has passed the validity test, so it looks it up again, then goes through essentially the same procedure as PRINT X+Y, except with a different mathematical operation and different variables.

Even at this snail's pace (electronically speaking), the answer's usually on the screen by the time you've lifted your finger from the Return key. In other words, BASIC is quite fast enough for some programs.

It's not fast enough, however, for high-resolution graphics or arcade-style games. That's because moving several objects simultaneously in a blast-the-aliens-as-fast-as-you-can game or updating flight-simulator scenery calls for rapid math calculations. The program must also react quickly to joystick movements and print recognizable pictures onscreen.

If you're into programming games, don't depend on BASIC to be able to handle the speed. Such programs virtually grind to a halt if they're written in BASIC, so programmers must resort to another language

BASIC's perfect for this. You simply tinker, test, and tweak until the program works. But does it really work under every conceivable condition?

A better way is to think of the structure before you ever begin. What are the main things you want to accomplish? Can tasks be broken into manageable modules of code? Can you use meaningful variable names? Can you help explain the code with remarks? Can you keep lines short?

So what is BASIC good for? In its ability to manipulate large amounts of data, in doing complex math problems, in the programming of simple music and sound effects, in giving tests, or in collecting data, BASIC shines.

For instance, if you want to write a program that creates and maintains a list, BASIC is the ideal programming language. First, it collects data using the INPUT and/or GET statements. It remembers data in the form of text (strings) or numeric variables. It can save your list to a disk and load it back into the computer. BASIC also works well sending data from the computer to a printer.

Two of the most popular programs I've written to illustrate various BASIC programming techniques are a quiz that teaches state capitals and a list-making program. Both are easily written in BASIC and work well. The user never realizes that the programs are not extremely fast.

All these ramblings are leading to a plea for your input to help me write this column. BASIC is a wonderful language, but what would you like to do with it? Would you like to gather data? Control appliances? Play music? Learn to type? Time reactions? Dial a phone?

I'd also like to know how long you, the reader and BASIC programmer, have been with me. Are you a programming veteran or a novice?

I'd really like to know what you would like to learn about, and do with, BASIC. I can be reached in care of COMPUTE, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □

WHERE TO FROM HERE? SOME BASIC RAMBLINGS

or else program in the language the computer understands—machine language. (But that's a topic Jim Butterfield covers in his column.)

Another bad reputation BASIC has garnered over the years is that it's unstructured and encourages sloppy programming. In other words, since there are so many ways to accomplish a given task, each programmer can approach a program in an individualistic and often hodgepodge way.

Quite a few columns back, Todd Heimark and I debated the relative merits of structured and unstructured programming. You can program either way in BASIC; other languages require more structure. I argued that structuring restricts creativity, elegance, and flexibility.

I tend to write programs top-down, starting at the top and working down until the program's finished.

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MACHINE LANGUAGE

J I M B U T T E R F I E L D

It seems pointless to have code that adds 0 to a number, or for that matter subtracts 0. After all, anything plus 0 gives an unchanged value, right?

In the case of a carry, adding/subtracting 0 can make good sense. For example, suppose you have the address of a variable stored in \$FD/FE and you want to move to the next variable, seven bytes away. After an initial CLC to clear the carry, you would add to the low part of the address with LDA \$FD, ADC #\$07, STA \$FD. How about the high part of the address? One way to do the job is to let the carry add in "naturally" with LDA \$FE, ADC #\$00, STA \$FE. The 0 might be viewed as the high-order part of the value 7.

There are several such tricks that involve adding 0; usually the carry flag plays a role. This time, I'd like to concentrate on a special trick: adding or subtracting 256 to a byte, in steps, causing its value to roll around to the original number.

All bytes must contain values in the range of 0 to 255, or \$00 to \$FF in hex. If I should add, say, 128 (hex 80) to any value and then do it again, the number will return to its original value. What's the point?

One example of adding 0 can be found in every Commodore 8-bit computer. It's part of a routine called CHRGET. On the 64, you'll see this code at addresses \$84-\$89. It looks like this:

```
0084 SEC
0085 SBC #$30
0087 SEC
0088 SBC #$D0
```

Successively subtracting hex 30 and D0 (decimal 48 and 208) walks the value in the A register completely around, leaving it where it started. What's the point?

As it turns out, this clever piece of code adjusts the carry according to the value in the A register. If the value is below hex 30, the carry will be set; if it's above, the carry will be clear. The

flag will be used by the program that called this subroutine.

Another clever and interesting piece of code that has been showing up lately is used in converting a value to hexadecimal ASCII prior to printing it. The number is split into two four-bit groups, each of which will be translated to a printable character in the hexadecimal range 0-9 or A-F.

EVERYTHING
MEANS
LESS
THAN
ZERO

Once you've isolated the four-bit nybble with a value ranging from 0 to 15, the usual method is to test to see if it's less than 10. If so, add hex #30 to create a character from 0 to 9; otherwise, add hex #\$37 to produce A to F. There are many variations of this basic method, but they all involve two additions and a test.

The clever method rolls the number completely around, and then some! If you do this in decimal mode, the number will end up at the right place with no tests needed. And this method deliberately puts the carry flag to use to get the numbers exactly where they're wanted.

Here's the method. First, the program sets decimal mode. We'll discuss the effects of this in a moment. The

carry flag is cleared, and we add 90 decimal. The code so far reads as follows:

```
SED
CLC
ADC #$90
```

Let's see what happens so far. If the original value was in the range 0-9, adding hex 90 in decimal mode will yield \$90-\$99, and the carry flag will be clear. If the number was in the range 10-15 (hex A-F), adding will produce 100-105, or more accurately, 00-05 hex with the carry flag set. Note that decimal mode has been used with numbers that aren't in true decimal format; in principle, values such as A or F would not be legal BCD. No matter—the computer will adjust the value correctly.

The rest of the calculation is straightforward. Remaining in decimal mode and leaving the carry flag as is, we add 40. The code is a simple ADC #\$40, followed by clearing decimal mode with CLD.

If the original value was in the range 0-9, its modified value of 90-99 will be added to 40 (decimal mode, of course), producing the correct result of \$30-\$39. There will be a resulting carry, but that doesn't matter.

On the other hand, if the original value was 10-15 (hex A-F), the modified value of 00-05 will be added to 40, plus a carry! This will yield a result of 41-46, the correct ASCII values for letters A-F.

Numeric or ASCII, the number is ready to print. And there were no comparison tests.

The little program that follows simply displays its first 12 bytes in hexadecimal. It gives you an easy way of checking the above method and seeing the usual way of separating a byte into its two nybbles.

The program runs on virtually all 8-bit Commodore computers. One caution should be observed: If an interrupt occurs while the computer is in decimal mode, the interrupt program will run in decimal mode. That's

MACHINE LANGUAGE

not serious for normal interrupt routines, but there's an anomaly with Commodore computers prior to the VIC-20. On such computers (PET, CBM), the keyboard-reading routine uses the ADC instruction; as a result, false keyboard values are seen if a decimal-mode interrupt takes place. You may eliminate this effect by locking out the IRQ during the time you're in decimal mode; issue the command SEI just before SED and the command CLI right after CLD. Even with a newer machine, I recommend that you try your hand at adding this coding. It's good practice.

2000 LDX #000

The loop that counts the 12 bytes will be controlled from the X register. The program will be at hex 2000, so that's where we will read the bytes from.

2002 LDA \$2000,X

The value to be printed in now is in the A register. To split it into two parts, we'll save (push) it on the stack and then extract the first nybble.

2005 PHA

Get the high nybble by shifting the contents of A to the right four times. Zero bits slide into the right side, and the high bits move to the low end of the byte. The low bits are lost. We'll bring them back when we pop the stack.

Your assembler might prefer that you type LSR A rather than the LSR shown. Give it whatever it wants.

2006 LSR

2007 LSR

2008 LSR

2009 LSR

The high nybble is converted to a binary value from 0 to 15. We're ready to do the conversion. The following code could be made into a sub-routine, since we'll use it again for the low nybble.

200A SED

200B CLC

200C ADC #90

200E ADC #40

2010 CLD

Conversion complete. Let's print the character we've created.

2011 JSR \$FFD2

Pull the original value from the stack with PLA and use AND to isolate the low nybble. Convert to ASCII and print.

2014 PLA

2015 AND #\$0F

2017 SED

2018 CLC

2019 ADC #90

201B ADC #\$40

201D CLD

201E JSR \$FFD2

For neatness, print a space so that the next byte will be separated from this one.

2021 LDA #20

2023 JSR \$FFD2

On to the next byte, unless we have done 12 (hex 0C), in which case we quit.

2026 INX

2027 CPX #0C

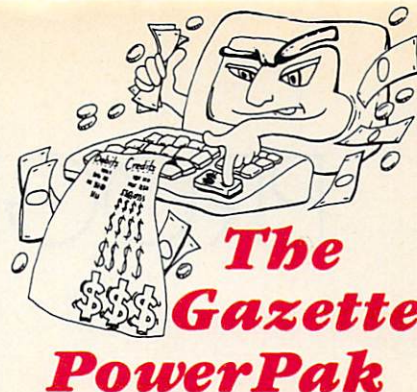
2029 BNE \$2002

202B RTS

It's a neat method, and it illustrates how a little thought can produce elegant number handling. And it's not too clever—the code is sound.

Rolling a number around by adding or subtracting 0? It can be quite handy.

```
100 DATA 162,0,189,0,32
110 DATA 72,74,74,74,74
120 DATA 248,24,105,144
130 DATA 105,64,216,32
140 DATA 210,255,104,41
150 DATA 15,248,24,105,144
160 DATA 105,64,216,32
170 DATA 210,255,169,32
180 DATA 32,210,255,232
190 DATA 224,12,208,215,96
200 FOR J=8192 TO 8235
210 READ X
220 T=T+X
230 POKE J,X
240 NEXT J
250 IF T<>5402 THEN STOP
300 PRINT "HEX CONVERSION"
310 PRINT "DEMO"
320 SYS 8192
```



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PROGRAMMER'S PAGE

R A N D Y T H O M P S O N

You stare at it all the time. BASIC's PRINT statement depends on it. All of your software would be useless without it. I am, of course, talking about your computer screen.

This month I've selected a couple of tips designed to manipulate your computer's most visual component. Both were sent in by readers, as was a correction to November's column.

Cursor Control

This short 64 program gives BASIC programmers a cursor-locate command and a box-clear command.

```
KH 10 FOR I=679TO748:READ D:PO
    KE I,D:NEXT
CK 20 DATA 32,182,2,134,176,32
    ,182,2
PS 30 DATA 164,176,24,32,240,2
    55,96,32
XC 40 DATA 253,174,32,158,183,
    96,32,167
GE 50 DATA 2,134,177,32,182,2,
    232,134
DF 60 DATA 178,32,182,2,134,17
    9,169,32
JB 70 DATA 166,176,164,177,32,
    210,255,232
AB 80 DATA 228,178,208,248,196
    ,179,208,1
HB 90 DATA 96,230,177,166,177,
    164,176,24
SD 100 DATA 32,240,255,24,144,
    224
```

This program stores two machine language routines in memory starting at location 679.

To position the cursor on the screen after running the program above, all you have to do is enter SYS 679, *X*, *Y* where *X* is the desired horizontal position (0-39) and *Y* is the desired vertical position (0-24).

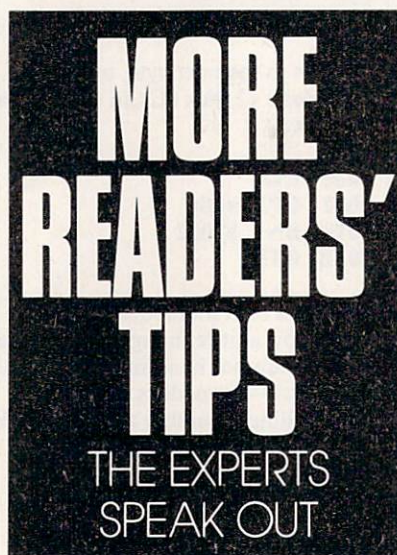
The syntax for the second routine, which clears any rectangular area on the computer screen, is SYS 701, *X1*, *Y1*, *X2*, *Y2*. Coordinates *X1*, *Y1* and *X2*, *Y2* specify the upper-left and lower-right corners of the area to clear, respectively. So to clear a 10 × 10 character area in the middle of the screen, you'd use the command SYS 701, 14, 7, 23, 16.

ERIK MARTIN
DENTON, TX

Scrolling Down

Scrolling your computer's text screen up a line is easy: Simply move the cursor to the bottom of the screen and execute a PRINT statement.

Scrolling the screen down is not as simple. The November 1989 "Programmer's Page" shows you how you can use a PRINT instruction to make the 64's screen scroll down, but there's another way to accomplish this feat. Move the cursor to any spot on the screen and execute the command SYS 59749. Anything below the cursor will scroll downward. Lines located above the cursor remain in place.



Calling this ROM routine repeatedly can cause a strange side effect, however. For example, clear your 64's screen by pressing SHIFT-CLR/HOME, type SYS 59749, and press Return. Now, cursor up until your cursor is back on top of the SYS command and press Return again. Repeat this last step four more times. On the fourth try, your cursor takes a strange detour before reaching the top of the screen.

The cause of this misdirection has to do with how the 64 manages its screen. Using a screen line link table, found at locations 217-242, your

computer keeps track of lines that have a logical length of 40 or more characters (BASIC program lines that take up two screen lines, for example). The ROM routine located at 59749 moves lines down by adding 40 spaces to the beginning of the current line. This creates a line with a logical length of 80 characters, or two screen lines. Repeated calls to 59749 can wreak havoc on the screen line link table, however. With direct calls to this ROM routine, it's possible to create logical lines that are longer than the system is prepared to handle. With a little preparation you can keep this table in check and keep your scroll-down routine from confusing your cursor.

To safely scroll the screen down, position the cursor on the desired line and then type in and execute the following instructions:

```
L=PEEK(214)+218:POKE
L,PEEK(L) OR 128:SYS 59749
```

The POKE command updates the screen line link table before SYS 59749 takes effect. This ensures that no logical lines exceed the size of two screen lines, and scrolling down works as expected.

ADAM D. KROPELIN
JEFFERSONVILLE, VT

Oops

In your November column, there's an error in the program that copies BASIC and Kernal ROM. In line 20 the first value in the FOR-NEXT loop should be 57344, not 7344. It doesn't change anything, but it does take an unnecessarily long time to run. Also, the location for the INPUT prompt character is 43846, not 53846. HUBERT CHAN
ST. ALBERT, AB, CANADA

We're interested in seeing your best programming tips and tricks. Send your submissions to Programmer's Page, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We'll pay \$25-\$50 for each tip that we publish. □



PROGRAMS

L Y S L E E . S H I E L D S I I I

How many times have you been stuck in a crossword puzzle, trying to find a three-letter word that ends in *u* for a large, flightless bird? Many people enjoy spending time solving as well as making crossword puzzles, but finding the appropriate word is not always easy. A computer with a program such as *Cross Aid* can help.

Cross Aid searches a database by length of word and the known letters in that word. It also lets crossword fans edit and compile their own crossword databases. In the above case, it would search for all three-letter words that end in *u*. If the word has been entered in the database, any crossword puzzle fan would expect the program to find the word *emu*.

Entering the Program

Cross Aid is written entirely in machine language. To enter this program, you'll need *MLX*, our machine language entry program (see "Typing Aids" elsewhere in this section). When *MLX* prompts you, respond with the values given below.

Starting address: 0801

Ending address: 1168

When you've finished typing, be sure to save a copy of the program before exiting *MLX*.

Although *Cross Aid* is written in machine language, it loads and runs like a BASIC program. Upon entering the program, you'll see the title and a word-entry box. At this point you may type in a word to search for or add a word to the database. Other operations include correcting or deleting words already in the database.

To add a word and to search for a word are almost the same operation. Type in the word to add or search for and press Return. If the word is already in the database, then it will be shown, and the bottom line will report that one word has been found. However, if the word is not found, the program will ask if you wish to add the word to the database. Answer yes by

pressing Y or no by pressing N.

In addition to searching for whole words, you can search for words with missing letters. This is where the program comes in handy in helping you solve crossword puzzles. When you enter a period, number, or any character other than a letter in the unknown character positions, the computer will turn these illegal characters into question marks. You'll then be asked if you accept the word.

CROSS AID

USE THIS HANDY
DATABASE FOR THE
64 TO HELP SOLVE
CROSSWORD
PUZZLES

The computer will then search for all the words in the database that match this combination. They will be reported and totaled at the bottom of the screen. If more words are found than the screen can hold, you will be prompted with a question either to stop or to continue. Press S to end the listing or any other key to continue.

If It Quacks

For example, suppose you need a four-letter word for *water fowl* that starts with the letters *du*. Simply type in the first two letters and then two periods for the missing letters. Depending on what words are in your database, you may get *duck*, *dude*, *duel*, and *duke*. If you knew only that

the word ended in *k*, you could type three periods and the final letter. All four-letter words ending in *k* in your database would then appear.

In addition to creating the database, you may at times need to perform maintenance on it. *Cross Aid* gives you two ways to edit: correct a word or delete one. To enter maintenance mode, type in a word that will bring up the misspelled word and then press Shift-Return. As with normal searches, a list will appear that matches the word pattern. A cursor will appear in the list. Move the cursor over the mistake and retype the letters to correct the spelling error or errors. Be careful not to edit a word into one that already exists or a duplicate will result in the database.

To delete a word, move the cursor over a word and press Shift-D. The word will disappear. When you've finished making changes to the database, press Return.

It's very important to end the program correctly. Otherwise, you may find that many of the words you thought you entered will be missing from the database. To end, simultaneously press the Commodore key and the S key. This will cause the computer to save vital information needed for the database.

Create a Directory

The first time you run the program, it will search for the directory of words in your database. Since you haven't created one yet, the light on your disk drive will flash. You may ignore it and continue the program. As soon as you've entered some words, the program will save them automatically in a file called *CROSS.DIR* when you end the program.

It will take a little effort for you to build up a useful database, but it won't be long before you have a good selection of words commonly found in crossword puzzles. Use the program a few times, and its value should soon become apparent. As an additional piece of advice, using a fast loader will help the speed of the program.



PROGRAMS

CROSS AID

```

0801:0D 08 0A 00 9E 28 32 30 05
0809:38 30 29 00 00 00 7A E0
0811:28 A9 80 20 90 FF 4C 90 5F
0819:09 AA AA AA AA AA 4C F9
0821:38 08 4C 6A 10 4C DE 0F DD
0829:4C FE 10 4C 8E 10 4C 9D D0
0831:10 4C B6 10 60 EA EA A9 62
0839:00 20 90 FF 20 68 10 20 46
0841:EE 0A 20 4E 0B B0 3B 38 FD
0849:20 3A 0A C9 00 F0 1C C9 9B
0851:01 D0 09 20 E8 0A C9 00 3C
0859:F0 11 D0 F3 A9 01 20 85 96
0861:0C C9 53 F0 06 20 BA 0C 95
0869:18 90 DD A5 6B D0 08 20 8E
0871:4C 0C B0 03 4C 02 0C 20 93
0879:5B 0C A9 00 20 85 0C 4C EA
0881:40 08 20 BA 0C 38 20 3A 1F
0889:0A 48 18 90 08 20 BA 0C FE
0891:18 20 3A 0A 48 20 C0 08 E9
0899:68 C9 00 F0 17 C9 01 D0 12
08A1:EC 20 B2 09 20 A8 10 20 FA
08A9:49 0A C9 00 F0 06 48 D0 1B
08B1:E4 18 90 D9 20 5B 0C A9 1A
08B9:00 20 85 0C 4C 40 08 A9 60
08C1:07 85 6A A9 00 85 69 A9 31
08C9:F0 85 65 A9 04 85 66 A4 A2
08D1:69 B1 65 09 80 91 65 20 75
08D9:E4 FF F0 FB 48 A4 69 B1 93
08E1:65 29 7F 91 65 68 C9 0D 65
08E9:D0 03 4C 68 09 C9 04 D0 7B
08F1:03 4C 5F 09 A2 03 DD 26 16
08F9:0E F0 05 CA 10 F8 30 31 90
0901:18 BD 2A 0E 65 69 C9 FF 19
0909:F0 C5 C9 28 F0 C1 85 69 C3
0911:18 BD 2E 0E 65 6A C9 18 C5
0919:F0 B5 C9 06 F0 B1 85 6A 6E
0921:18 BD 32 0E 65 65 85 65 07
0929:BD 36 0E 65 66 85 66 D0 A6
0931:9E 29 3F 0E 9A C9 1B 10 16
0939:96 85 50 A4 69 20 13 0A 48
0941:A5 61 F0 8B A5 62 F0 87 75
0949:A9 07 20 E0 09 A5 50 A4 28
0951:69 91 65 C8 C0 28 F0 02 40
0959:84 69 18 4C D0 08 A9 0B D4
0961:20 E0 09 18 4C D0 08 A9 BD
0969:F0 85 FB A9 D8 85 FC A0 E6
0971:00 B1 FB 29 F0 C9 07 F0 A0
0979:14 C9 0B D0 1C 20 06 0A ED
0981:A9 FF A0 00 91 61 A9 00 E1
0989:8D 0D F0 0C 20 06 0A AB
0991:A0 00 B1 65 91 61 8C 0D B8
0999:00 E6 FB D0 02 E6 FC A5 3D
09A1:FC C9 D0 D0 CC A5 FB C9 EB
09A9:C0 09 C6 20 15 0D 4C BA 5B
09B1:0C 20 5A 10 A9 00 85 FB 72
09B9:85 FD A9 A0 85 FC 85 FE 77
09C1:A0 00 B1 FD C9 FF F0 08 72
09C9:91 FB E6 FB D0 02 E6 FC 99
09D1:E6 FD D0 02 E6 FE B1 FD A5
09D9:D0 E8 91 FB 4C 63 10 85 16
09E1:51 20 13 0A A4 69 C0 00 F3
09E9:F0 0B B1 65 88 F0 06 C9 A1
09F1:20 D0 F7 C8 C8 A5 51 91 E4
09F9:FB C8 B1 65 C0 28 F0 04 55
0A01:C9 20 D0 F1 06 A5 FB 85 52
0A09:65 A5 FC 29 03 18 69 04 BA
0A11:85 66 A5 66 29 03 AA 18 5F
0A19:69 D8 85 FC 8A 18 69 80 A0
0A21:85 64 8A 18 69 84 85 62 AE
0A29:A5 65 85 FB 85 61 85 63 F9
0A31:B1 61 85 61 B1 63 85 62 C5
0A39:60 90 A0 20 8E 10 20 23 FC
0A41:0C AA 18 90 03 20 9D 10 F5
0A49:A9 06 85 66 A9 EF 85 6D 50
0A51:A9 04 85 6E A9 00 85 67 92

```

```

0A59:AD 64 0E C9 FF F0 07 C9 57
0A61:00 D0 06 A9 00 60 A9 01 DA
0A69:60 20 2D 0C AD 11 00 85 53
0A71:FD AD 12 00 85 FE A5 6D 13
0A79:85 FB A5 6E 85 FC 18 A5 E0
0A81:67 65 FB 85 61 85 B8
0A89:63 90 02 E6 FC A5 FC 29 C3
0A91:03 48 18 69 80 85 62 68 1A
0A99:18 69 84 85 64 A0 00 B9 5C
0AA1:64 0E C8 91 FB A5 FD 91 A1
0AA9:63 A5 FE 91 61 E6 FD D0 45
0AB1:02 E6 FE C4 68 D0 E8 38 3D
0AB9:A5 67 65 68 85 67 38 A9 91
0AC1:27 E5 68 C5 67 10 11 A9 93
0AC9:00 85 67 E6 66 18 A9 28 A9
0AD1:65 6D 85 6D 90 02 E6 6E 44
0AD9:A5 66 C9 17 D0 03 A9 02 EC
0AE1:60 20 9D 10 4C 59 0A 20 DE
0AE9:A8 10 4C 59 0A A9 93 20 B3
0AF1:D2 FF A9 0E 20 D2 FF A9 7B
0AF9:08 20 D2 FF A9 00 8D 20 FC
0B01:D0 8D 21 D0 A2 00 BD 5E 03
0B09:0D 9D 00 04 E8 E0 1C D0 21
0B11:F5 A9 28 85 FB A9 04 85 FD
0B19:FC A9 1D 85 FD A9 0E 85 4C
0B21:FE 20 F8 0C A9 50 85 FB 34
0B29:A9 04 85 FC A9 20 85 FD 6C
0B31:A9 0E 85 FE 20 F8 0C A9 E6
0B39:78 85 FB A9 04 85 FC A9 E0
0B41:23 85 FD A9 0E 85 FE 20 49
0B49:F8 0C 4C 15 0D 20 38 0D 20
0B51:A9 01 85 68 A9 00 85 6B 77
0B59:A6 68 A9 A0 9D 50 04 20 72
0B61:E4 FF AA A5 91 C9 7F D0 1D
0B69:03 4C 11 0C E0 00 F0 EF CF
0B71:E0 5F D0 03 20 35 08 E0 E0
0B79:AE D0 03 4C 11 0C E0 0D C7
0B81:D0 04 18 4C BB 0B E0 8D 22
0B89:D0 04 38 4C BB 0B E0 14 B4
0B91:D0 11 A6 68 A9 20 9D 50 09
0B99:04 E0 01 F0 01 CA 86 68 C1
0BA1:4C 59 0B 8A A6 68 E0 26 FC
0BA9:D0 03 4C 60 0B 29 3F A6 9A
0BB1:68 9D 50 04 E8 86 68 4C 2C
0BB9:59 0B 08 A9 00 85 6C A6 70
0BC1:68 A9 20 9D 50 04 CA D0 4D
0BC9:04 28 4C 4E 0B 8E 3B 0E 71
0BD1:86 68 BD 50 04 C9 00 F0 3A
0BD9:04 C9 1B 30 09 A9 3F 9D D5
0BE1:50 04 A0 01 84 6B 9D 3B 8D
0BE9:0E CA D0 E6 A5 6B D0 02 C0
0BF1:28 00 A9 02 20 85 0C C9 82
0BF9:4E D0 04 28 4C 4E 0B 28 48
0C01:60 A9 03 20 85 0C C9 59 5F
0C09:D0 03 20 B6 10 4C 40 08 F3
0C11:A9 00 8D 3B 0E 20 8E 10 81
0C19:20 FE 10 68 68 A9 04 4C C7
0C21:85 0C A9 30 A2 05 95 57 E2
0C29:CA 10 FB 60 A2 05 B5 57 1C
0C31:A8 C8 C0 3A D0 04 CA 10 C7
0C39:F5 E8 98 95 57 A0 30 E8 79
0C41:E0 06 F0 06 98 95 57 18 AB
0C49:90 F5 60 A2 05 B5 57 C9 D4
0C51:30 D0 05 CA 10 F7 18 60 F3
0C59:38 60 A2 00 B5 57 C9 30 C8
0C61:D0 05 E8 E0 05 D0 F5 A0 46
0C69:01 B5 57 99 C0 07 C8 E8 90
0C71:E0 06 D0 F5 C8 A2 00 BD 83
0C79:50 0D 99 C0 07 C8 E8 E0 4A
0C81:0E D0 F4 60 0A AA BD 7A 6A
0C89:0D 85 FB 6D 7B 0D 85 FC FC
0C91:A0 E0 A2 00 B1 FB D0 01 6E
0C99:E8 E0 00 F0 02 A9 20 09 6D
0CA1:80 99 A0 04 C8 C0 28 D0 1F
0CA9:EB 20 43 0D 48 A9 20 A0 C2
0CB1:27 99 A0 04 88 10 FA 68 FA

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0CB9:60 A9 A0 85 FB A9 04 85 EC
0CC1:FC A2 14 A5 FB 85 61 85 1C
0CC9:63 A5 FC 29 03 48 18 69 02
0CD1:80 85 62 68 18 69 84 85 53
0CD9:64 A0 27 A9 20 91 FB A9 B4
0CE1:00 91 61 91 63 88 10 F3 F4
0CE9:18 A9 28 65 FB 85 FB 90 52
0CF1:02 E6 FC CA 10 CD 60 A0 2A
0CF9:00 B1 FD 48 A0 02 B1 FD 31
0D01:48 88 B1 FD 91 FB C8 C0 46
0D09:27 D0 F9 68 91 FB A0 00 6E
0D11:68 91 FB 60 A9 00 85 FB 9D
0D19:A9 D8 85 FC A2 18 BD 04 B3
0D21:0E A0 27 91 FB 88 10 FB 86
0D29:18 A9 28 65 FB 85 FB 90 93
0D31:02 E6 FC CA 10 E8 60 A9 E0
0D39:20 A2 26 9D 50 04 CA D0 A3
0D41:FA 60 20 E4 FF F0 FB 48 47
0D49:20 E4 FF D0 FB 68 60 17 13
0D51:0F 12 04 28 13 29 20 06 FD
0D59:0F 15 0E 04 2E 20 20 20 94
0D61:20 20 20 20 20 20 20 20 7B
0D69:20 43 12 0F 13 13 20 41 FD
0D71:09 04 20 16 31 2E 30 20 39
0D79:20 84 0D A3 0D B6 0D CA C8
0D81:0D E7 0D 20 50 12 05 13 A7
0D89:13 20 01 0E 19 20 0B 05 9A
0D91:19 20 14 0F 20 03 0F 0E EC
0D99:14 09 0E 15 05 20 2E 2E 46
0DA1:2E 00 20 4D 0F 12 05 20 96
0DA9:2E 2E 2E 20 28 13 30 53 89
0DB1:14 0F 10 29 00 20 41 03 34
0DB9:03 05 10 14 20 57 0F 12 68
0DC1:04 3F 20 28 59 2F 4E 29 81
0DC9:00 20 4E 0F 14 20 46 0F 63
0DD1:15 0E 04 2E 20 20 41 04 65
0DD9:04 20 57 0F 12 04 3F 20 19
0DE1:28 59 2F 4E 29 00 20 45 FF
0DE9:0E 04 20 0F 06 20 50 12 64
0DF1:0F 07 01 08 0D 2E 20 20 77
0DF9:54 08 01 0E 0B 20 19 0F 5B
0E01:15 2E 00 02 06 06 06 06 AD
0E09:06 06 06 06 06 06 06 06 25
0E11:06 06 06 06 06 06 06 02 29
0E19:05 05 05 07 70 40 6E 5D C8
0E21:20 5D 6D 40 7D 1D 9D 11 03
0E29:91 01 FF 00 00 00 00 01 4F
0E31:FF 00 00 28 D8 00 00 00 96
0E39:FF 00 00 00 00 00 00 00 57
0E41:00 00 00 00 00 00 00 00 5D
0E49:00 00 00 00 00 00 00 00 65
0E51:00 00 00 00 00 00 00 00 6D
0E59:00 00 00 00 00 00 00 00 75
0E61:00 00 00 00 00 00 00 00 7D
0E69:00 00 00 00 00 00 00 00 85
0E71:00 00 00 00 00 00 00 00 8D
0E79:00 00 00 00 00 00 00 00 95
0E81:00 00 00 00 00 00 00 00 9D
0E89:00 00 00 40 30 3A 43 52 EC
0E91:4F 53 53 2E 44 49 52 80 E3
0E99:40 20 10 08 04 02 01 04 CA
0EA1:30 34 43 52 4F 53 53 2E 8E
0EA9:23 23 00 00 A9 00 85 FB 74
0EB1:A9 A0 85 FC A9 00 A8 91 7B
0EB9:FB C8 D0 FB E6 FC A5 FC 53
0EC1:C9 BF D0 F0 60 A9 00 AA 30
0EC9:9D 00 C8 E8 D0 FA 60 A5 35
0ED1:0C C5 0B D0 07 AD 3B 0E 47
0ED9:C5 09 F0 2F 20 10 0F A9 35
0EE1:00 85 07 A9 A0 85 08 A9 AF
0EE9:FF 85 0D A5 0C 85 0B AD 9D
0EF1:3B 0E 85 09 20 04 11 90 34
0EF9:13 20 40 11 A9 20 0E 3A 26
0F01:0E A0 FF 20 BA FF A9 00 79
0F09:20 D5 FF 60 4C AD 0E A5 8D
0F11:09 D0 01 60 A5 0D C9 00 03

```


PROGRAMS

0F19:D0 34 20 5A 10 20 8B 0F 7D	0FE1:8C A0 0E 20 BD FF A9 20 93	10A9:1A 10 90 F0 A9 00 8D 64 C8
0F21:E6 FB D0 02 E6 FC 20 40 97	0FE9:AE 3A 0E A0 FF 20 BA FF AF	10B1:0E 60 4C 28 10 A9 00 85 A9
0F29:11 A9 20 AE 3A 0E A0 FF 74	0FF1:A9 00 4C D5 FF A9 0C A2 2D	10B9:0C 20 04 11 90 04 E6 0C E7
0F31:20 BA FF A9 00 85 FD A9 64	0FF9:8C A0 0E 20 BD FF A9 20 AB	10C1:D0 F7 A6 0C E0 00 F0 01 C7
0F39:A0 85 FE A9 FD A6 FB A4 AA	1001:AE 3A 0E A0 FF 20 BA FF C8	10C9:CA 86 0C 20 D0 0E 20 5A CD
0F41:FC 20 D8 FF A9 FF 85 0D 66	1009:A9 00 85 FD A9 C8 85 FE 09	10D1:10 20 8B 0F 20 63 10 A5 B8
0F49:20 63 10 20 35 11 60 20 23	1011:A9 FD A2 C0 A0 C8 4C D8 7F	10D9:FB 18 6D 3B 0E 85 FB 90 6E
0F51:5A 10 A5 07 85 FB A5 08 35	1019:FF E6 0C 20 04 11 90 05 01	10E1:02 E6 FC A5 FC C9 BF D0 16
0F59:85 FC A0 00 B1 FB F0 25 12	1021:20 D0 0E 18 60 38 60 20 8D	10E9:0D 20 10 0F E6 0C E6 0B CB
0F61:B9 3C 0E C9 3F F0 04 D1 61	1029:5A 10 A0 00 A5 07 85 FB DE	10F1:20 AD 0E 20 35 11 A9 00 92
0F69:FB D0 0B C8 CC 3B 0E D0 E7	1031:A5 08 85 FC B1 FB 99 64 BB	10F9:85 0D 4C A3 0F 20 10 0F 0C
0F71:EB 20 63 10 18 60 18 AD 1B	1039:0E C8 CC 3B 0E D0 F5 20 9F	1101:4C F6 0F A9 00 85 FC A5 39
0F79:3B 0E 65 07 85 07 90 02 41	1041:63 10 18 AD 3B 0E 65 07 D8	1109:09 0A 26 FC A8 68 29 07 28
0F81:E6 08 18 90 CD 20 63 10 E6	1049:85 07 90 02 E6 08 A5 FB BE	1111:FB 18 A9 00 65 FB 85 FB 8E
0F89:38 60 A9 00 85 FB A9 A0 21	1051:85 11 A5 FC 85 12 A9 00 C4	1119:A9 C8 65 FC 85 FC A5 0C 36
0F91:85 FC A0 00 B1 FB F0 07 2C	1059:60 A5 01 85 0E 29 FE 85 24	1121:48 4A 4A A8 68 29 07 28
0F99:C8 D0 F9 E6 FC D0 F5 84 99	1061:01 60 A5 0E 85 01 60 20 C0	1129:AA B1 FB 3D 98 0E D0 02 01
0FA1:FB 60 20 5A 10 20 8B 0F A6	1069:AD 0E 20 C6 0E A9 00 85 F0	1131:18 60 38 60 20 04 11 B1 69
0FA9:A6 FC 18 A5 FB 6D 3B 0E D1	1071:07 A9 A0 85 08 A9 00 8D 60	1139:FB 1D 98 0E 91 FB 60 A5 77
0FB1:90 01 E8 E0 BF F0 21 A0 28	1079:3B 0E 85 09 8D 3C 0E 8D 03	1141:09 A2 30 A8 38 E9 0A 90 2F
0FB9:00 B9 3C 0E 91 FB C8 C4 81	1081:64 0E 85 0B 85 0C A9 FF 68	1149:03 E8 D0 F7 98 09 30 8D 97
0FC1:09 D0 F6 A9 00 91 FB A9 F9	1089:85 0D 4C DE 0F A9 00 85 CB	1151:AA 0E 8E A9 0E A5 0B 18 ED
0FC9:00 85 0D A9 00 85 07 A9 53	1091:07 A9 A0 85 08 A9 00 85 78	1159:69 41 8D AB 0E A9 0C A2 BE
0FD1:A0 85 08 20 63 10 18 60 90	1099:0C 20 D0 0E 20 50 0F 90 B3	1161:A0 A0 0E 4C BD FF 00 00 70
0FD9:20 63 10 38 60 A9 0C A2 CA	10A1:11 A9 FF 8D 64 0E 60 20 C9	

V I C T O R B A R B E E

On reconnaissance to a bleak and hazardous planet, you fall prey to the vile and loathsome Toiloots. You attempt to flee in your hovercraft, hoping to make a timely escape. You discover to your horror, however, that the fiends have sabotaged your ship's wiring. The positive and negative terminals on all the circuits are clearly marked, but the connecting cables now resemble an upturned pot of spaghetti.

You've managed to drive them off, but you can expect another attack at any time. Keep cool. You must use cunning and logic to reassemble the tangled array of cables, repair the damage, and blast off to safety. You'll also have to hurry before the cretins break through your hatch and grill you for lunch.

Wired is a puzzle that offers many variations and options. You must assemble a jigsaw-type picture using the joystick and onscreen pointer. A series of circuit lines comprise the picture, which looks like an electrical schematic diagram. The design is randomly created, so you never play the same game twice. Four sizes are available, and clues are provided to make the larger puzzles easier if you get in over your head. There's also a two-player option in which players race to solve identical puzzles.

Wired is written entirely in machine language. To enter the program, you'll need to use *MLX*, our machine language entry program (see "Typing

Aids" elsewhere in this section). When *MLX* prompts you, respond with the values given below.

Starting address: 0801

Ending address: 1BB8

WIRED

PONDER THE POSITIVE
AND NEGATIVE
POSSIBILITIES IN THIS
64 PUZZLER FOR ONE
OR TWO PLAYERS.
JOYSTICK REQUIRED.

Be sure to save a copy of the program before you exit *MLX*.

Plug in and Turn On

When you run the program, a menu will appear at the bottom of the screen. Plug a joystick into port 1 and press the fire button to begin. Use the joystick to highlight right or left to select the desired item. Use the Game option to choose the puzzle size.

There are four sizes for the one-player option and two sizes for two players.

Select the smallest size for a demonstration.

Highlight Make and press the fire button. A nine-square puzzle will appear. Click on Play, and the menu will disappear. You can now maneuver the white cursor arrow with the joystick. To exchange two pieces, click on one and then on the other. To rotate a piece to the right, click on a piece and then click again. You may continue to click and rotate until you've achieved the desired orientation.

The object of the game is to complete the circuits, joining wires to connect the positive and negative nodes. To see a completed picture, move the arrow to the bottom of the screen. The menu will reappear. Highlight Show at the far right of the menu and click the fire button. The puzzle will solve itself.

Each circuit forms a continuous line from one side of the board to another. Notice that each wire begins with a positive (+) node and ends with a negative (-) one. Knowing this is the key to solving the puzzles. Click on Make again to create another puzzle. The designs are created in a random fashion, so if one seems too difficult, just make another.

You may need some help with the larger grids. There are three hints to make the game easier and more colorful. After you've made a puzzle, click on Tint. Half the circuit wires and their appropriate nodes turn red. This added color will make the puzzle



PROGRAMS

easier to solve. Try clicking on Chex. The background for half the squares will change from dark to light blue. Click on Show to see the finished product. Notice that the dark and light squares alternate to form a checkerboard pattern. Chex and Tint can be used together or alternately.

Clicking on Test at any time will turn all the correctly placed pieces purple. Resuming Play will change them back. When a puzzle is correctly assembled, the circuit lines will flash, announcing a victory. The Win detector may not always report a solved puzzle due to the possibility of duplicate or symmetrical pieces. If a puzzle looks right to you, use the Test function to locate the offending pieces. If any of the hints are used during a game, the menu turns blue to keep you honest. After you've won, hit the fire button for the menu.

Double Your Fun

When you're ready to challenge a friend, click on Game to select the two-player option. Click on Make, and two puzzles will appear. They're identical, but one is flipped upside down. Click on Play. Now the orange arrow can be controlled by a joystick in port 2.

The rules for a two-player game are the same. Players can decide whether to allow hints or not. The circuit lines flash for the first completed puzzle. Either player can call up the menu, but the white arrow must be used to make selections.

The difficulty level ranges from fairly easy to almost impossible. A large puzzle played without hints can take hours to solve. On the other hand, a nine-square puzzle can be won in less than a minute.

WIRED

```
0801:0B 08 70 17 9E 32 34 30 6E
0809:37 00 00 00 20 20 20 96
0811:20 20 20 20 20 A0 C4 B9 06
0819:3C 08 99 F8 00 B9 FD 08 F6
0821:99 33 03 88 D0 F1 A0 09 4C
0829:B9 0C 08 99 FF 03 88 D0 A1
0831:F7 A9 86 85 2D A9 28 85 B6
0839:2E 4C 00 01 14 F0 04 86 76
0841:28 2F 1A B9 6E 09 99 E8 C3
0849:07 C8 D0 F7 EE 02 01 EE 19
0851:05 01 C6 F9 D0 ED A2 03 23
0859:20 34 03 F0 33 C9 07 D0 95
0861:16 A2 01 20 34 03 D0 0A A0
0869:A2 04 20 34 03 18 69 07 65
0871:10 05 A2 0A 20 34 03 85 1D
0879:A8 A5 A7 85 A9 A5 FE 85 FB
0881:F7 A5 FF 85 F8 20 6C 03 73
0889:A5 F8 85 FF A5 F7 85 FE 72
```

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0891:E8 20 34 03 D0 1E A2 08 21
0899:20 34 03 A0 02 84 A8 85 2A
08A1:A6 18 A5 FC 65 A6 85 F7 58
08A9:A5 FD 65 A7 85 F8 20 6C EF
08B1:03 4C 13 01 E8 20 34 03 FB
08B9:D0 1C A0 03 84 A8 E8 20 36
08C1:34 03 F0 08 A2 08 20 34 F4
08C9:03 4C 5C 01 A2 0C 20 34 C3
08D1:03 E6 A7 4C 5C 01 E8 20 AF
08D9:34 03 D0 0A E8 20 34 03 B2
08E1:18 69 04 A8 D0 D6 E8 20 37
08E9:34 03 D0 0A A2 02 20 34 21
08F1:03 18 69 06 D0 ED A2 08 A2
08F9:20 34 03 D0 E6 A9 00 85 F7
0901:A7 A4 FB F0 0C 06 FA 2A 37
0909:26 A7 C6 FB CA D0 F2 A8 D8
0911:60 48 B1 FE 85 FA A9 08 FE
0919:85 FB 68 A4 FE D0 02 C6 4A
0921:FF C6 FE C0 E7 D0 DE A4 B5
0929:FF C0 07 D0 D8 A9 37 85 BA
0931:01 58 4C D0 08 A4 A8 F0 49
0939:22 A5 F7 38 E5 A8 B0 03 7E
0941:C6 F8 38 85 F7 A5 FC E5 8A
0949:A8 B0 02 C6 FD 85 FC B1 3A
0951:F7 88 91 FC 98 D0 F8 C4 42
0959:A9 F0 0A B1 F7 C6 FD C6 76
0961:F8 C6 A9 10 EC 60 78 E6 98
0969:01 4C 16 08 60 00 0B 08 73
0971:0A 00 9E 32 30 36 31 E3 20
0979:80 8D 54 85 FB A9 08 1B C3
0981:A4 FD A9 78 85 FE A2 28 B7
0989:A0 86 20 29 08 4C 00 80 16
0991:00 00 8E 7A BD 8C 41 22 E1
0999:A0 56 91 FD A5 FC CD 28 88
09A1:B1 D0 08 A5 FB CD 27 08 98
09A9:D0 01 60 E6 FB D0 94 8B B6
09B1:27 E6 FD D0 E3 E6 FE A9 40
09B9:00 F0 DD 00 FF 90 CD FF A1
09C1:41 E3 64 E3 3D 65 A6 55 5A
09C9:EF FD 8E 97 8D 8B 3A 4E FB
09D1:E6 38 E6 E6 E6 B6 93 22 0C
09D9:A1 F8 8A 23 1B 0E 36 04 FF
09E1:5A E4 76 56 6A EB 04 8E 28
09E9:8B A7 0A 8F 07 20 80 83 23
09F1:02 A9 38 DA 48 59 92 97 88
09F9:8C A7 A2 AE 78 CA F0 38 84
0A01:2B 9E 36 8E 8A 8F 0C 40 EC
0A09:96 E1 83 8B 56 26 00 4E A3
0A11:E2 08 E9 90 11 78 C8 A9 84
0A19:79 D8 10 59 99 99 80 8F DB
0A21:6A A9 AD 8F 0C 01 6A 9A 57
0A29:9A 3B E9 69 02 EA EA E8 A7
0A31:A4 59 09 69 90 02 38 A9 4C
0A39:69 A8 06 8A 03 59 29 9A FF
0A41:5A A0 8B 5A 26 6A 6A 80 F1
0A49:1E 60 E6 40 02 E5 EA E8 CB
0A51:A1 A6 29 28 0E 65 9A 83 46
0A59:39 02 E0 65 40 0E AA A6 33
0A61:A6 66 66 56 AA 80 CB 2D B0
0A69:71 B6 FA C0 03 7A 98 55 90
0A71:F0 BF CA F3 9F E1 00 F3 05
0A79:5F E4 7A 72 75 50 04 08 E9
0A81:C8 7F 8B 32 08 D7 7F 9F AC
0A89:EE CF 7F 9C 2B 0F 20 2B C3
0A91:E0 2B 09 5E B9 34 07 19 AD
0A99:29 71 8C F9 C8 51 1D 03 98
0AA1:F9 F2 20 7B 7B 5B FB D1 3E
0AA9:FE 03 7B 6E C5 C4 10 FB B1
0AB1:D5 B0 7F 33 00 05 20 FF 54
0AB9:80 71 F8 70 E1 31 90 71 F6
0AC1:50 C7 5B 85 7B 73 D7 41 4E
0AC9:48 13 00 7D 21 1E 63 B3 9A
0AD1:F1 0C 10 C8 44 1C 03 50 59
0AD9:FD 02 FD 60 17 19 02 3E 92
0AE1:0B 58 3B 05 19 17 75 64 BD
0AE9:D4 11 FE 01 40 05 01 EF A4
0AF1:D5 C1 BF 3C 1F 1F 1E 11 DF
0AF9:17 40 3E 05 F7 39 07 73 E7
0B01:0C 64 04 40 76 23 A0 F3 30
0B09:20 23 E0 A3 FF 02 71 96 CF
0B11:2D 0F 96 16 0F CD 94 F2 81
0B19:60 D9 C8 DF C8 AA F5 60 2A
0B21:D9 F2 00 47 23 0F 98 8C 68
0B29:81 8C 42 C1 F0 88 13 3A 91
0B31:D6 4E 3C A6 E2 20 AF 83 B2
0B39:E5 C2 43 A0 08 06 06 20 E9
0B41:96 0A 8F 8A B0 E3 68 0E B3
0B49:96 12 8F 88 0A 8F 60 80 79
0B51:83 E5 8E 83 39 58 4E 3C B0
0B59:22 03 72 CA E6 60 89 A3 AB
0B61:B2 08 1E 96 21 8F 51 10 F9
0B69:F1 B0 19 F1 60 A9 F0 08 7A
0B71:8A 83 65 0E F3 38 CA 00 51
0B79:C4 03 67 0B EC 78 02 0A A7
0B81:0F 87 38 64 32 04 01 01 F2
0B89:2A 96 39 8A E7 38 BD F0 B6
0B91:98 8C 09 27 6B C4 A3 AD 0E
0B99:C2 63 21 C3 83 65 C3 A3 27
0BA1:37 01 9E 00 03 61 D9 F0 A9
0BA9:10 07 90 B0 38 38 EA C8 E7
0BB1:DA F0 58 C8 98 A8 83 65 DC
0BB9:8E AC 8D 81 0C 96 3B 0E 4B
0BC1:36 30 A0 20 8E 85 05 78 22
0BC9:02 A0 01 44 A0 60 01 27 1D
0BD1:02 02 02 C0 B2 4A 3C 0A F6
0BD9:32 12 80 65 C4 03 26 C3 36
0BE1:43 A0 50 2B 58 32 8A 45 64
0BE9:03 03 8B E5 C3 E3 A9 30 43
0BF1:0C 4F 3C DA 56 63 77 C3 A1
0BF9:63 B5 8E AC 3B 04 04 04 C9
0C01:04 3A 96 8D 8E 3B 0E 32 05
0C09:26 07 07 B2 58 EA 68 AA EB
0C11:F0 60 69 F1 78 BA F0 68 FE
0C19:E9 F0 60 39 F1 C8 56 0D 6E
0C21:6A C5 20 09 09 A8 58 3E 4E
0C29:3C BE 8A 84 0A 8F 85 3B 7D
0C31:2C 80 03 58 66 3C 12 95 43
0C39:00 19 C8 08 08 08 08 00 A1
0C41:06 50 97 62 F1 01 00 07 24
0C49:1B 28 60 1B 05 72 AF 01 09
0C51:9C 77 27 AB 22 6B 67 A0 63
0C59:20 59 83 CE B4 7B A7 79 91
0C61:30 92 40 21 80 E1 01 C9 A7
0C69:29 49 D0 C1 2D 70 A1 41 4E
0C71:FF A3 31 A1 F1 3B 4C 0C D3
0C79:91 20 08 8C A1 C1 1B 10 86
0C81:F0 72 E4 75 64 58 17 49 9E
0C89:47 F0 EA 85 10 CE CF C7 5A
0C91:85 AD 01 DC 29 08 D0 D1 A2
0C99:07 97 2A EA 8F CA 41 88 C1
0CA1:EE F1 0B 92 80 20 5D 80 F7
0CA9:C9 A5 AE 26 07 06 21 37 12
0CB1:07 98 AD CA 4C 50 80 A8 23
0CB9:60 B9 27 78 04 90 18 2A 99
0CC1:69 00 61 19 1C F7 C9 53 F3
0CC9:99 C2 96 C3 80 08 C4 88 A4
0CD1:C5 5F 99 C6 5F 60 00 FF C0
0CD9:2F B9 80 AD F1 8B AE 46 44
0CE1:BA 97 C5 13 44 FA 8C 02 50
0CE9:25 06 EA E4 2D 94 8D 19 6D
0CF1:8C 84 29 4C 08 92 E2 95 C4
0CF9:32 61 6F 95 C9 04 80 1E 48
0D01:7A 95 4C 80 89 A9 61 42 47
0D09:F0 82 A9 01 20 6F 80 DC 1E
0D11:12 A9 10 9D CC 5F 60 6D 8C
0D19:19 05 D0 08 82 21 09 2A 87
0D21:2C 20 98 03 20 09 20 8D 8F
0D29:11 C0 03 20 09 10 8D 16 18
0D31:C0 05 40 09 08 29 0F 09 91
0D39:70 8D 18 D0 AD 30 4E 09 D2
0D41:03 8D 02 DD AD C0 06 29 04
0D49:FC 09 02 8D 00 DD C0 A3 D9
0D51:9F DA DB 8D DB 54 35 82 63
0D59:11 09 01 60 11 61 10 01 93
```




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0D61:62	11	63	10	01	64	11	65	7F	0FC1:C9	0F	F0	2E	00	70	C7	00	DA	1221:C6	07	85	02	14	14	07	85	BF
0D69:10	01	66	11	67	10	01	68	8F	0FC9:64	18	12	03	CF	FB	B1	FB	60	1229:43	31	BE	88	56	89	06	E4	65
0D71:11	69	10	01	6A	11	6B	10	FE	0FD1:CD	AB	82	D0	04	18	6E	67	E3	1231:88	EE	88	AD	80	40	CD	E2	C4
0D79:01	6C	11	6D	10	01	6E	11	9A	0FD9:1A	AD	F0	E6	FC	E8	E0	06	58	1239:85	D0	DB	60	A9	55	08	DF	68
0D81:6F	10	01	70	11	71	10	01	ED	0FE1:D0	E9	C4	70	C2	AF	82	8D	E9	1241:28	90	AE	E0	AA	8A	D0	08	AA
0D89:72	11	73	10	01	74	11	75	02	0FE9:AE	82	4C	47	83	60	B8	D2	DF	1249:18	A5	00	69	08	85	00	60	30
0D91:10	01	76	11	77	10	01	78	4A	0FF1:4C	34	83	A0	78	78	D1	01	08	1251:3C	0E	8C	05	A9	AA	8D	64	70
0D99:11	79	10	01	7A	B9	7B	11	30	0FF9:50	F0	50	36	90	66	66	61	36	1259:BD	87	04	82	29	04	D0	02	E3
0DA1:31	7B	C8	D0	A6	44	67	00	6E	1001:61	47	41	06	00	53	53	18	38	1261:A2	10	16	6B	16	24	8A	18	C2
0DA9:B9	08	BC	02	10	7E	B9	98	E0	1009:18	CB	DF	EA	40	15	6A	02	FF	1269:6D	E3	85	9A	25	18	0A	A0	D5
0DB1:C0	4D	C9	28	08	D0	0A	B5	88	1011:20	E0	48	28	20	90	30	90	39	1271:08	E8	BD	A0	85	2D	E1	85	BF
0DB9:D2	FF	99	CF	6E	5F	7D	82	DB	1019:76	76	7B	7B	77	76	7C	7B	43	1279:91	F3	F1	2D	C1	90	8C	C8	A6
0DC1:84	E0	A9	C0	8D	EF	7D	EA	A9	1021:71	6B	A6	A0	7D	7D	B8	B8	BF	1281:3B	03	01	AD	E4	85	C9	08	D7
0DC9:96	C0	78	5A	60	7D	28	7E	DB	1029:00	FB	47	D0	3D	29	10	80	6D	1289:D0	DA	60	E1	C3	0D	F1	0C	39
0DD1:99	A0	7E	02	2F	A0	E4	A2	39	1031:20	80	67	67	62	62	68	67	B9	1291:09	37	4F	0A	C3	3C	0D	06	C1
0DD9:77	AD	B2	81	9C	99	00	20	F4	1039:63	62	45	3F	4D	46	51	51	B7	1299:63	B7	60	00	58	21	F0	84	17
0DE1:01	FA	5C	99	F4	5D	99	9E	4F	1041:5F	5F	80	7D	20	C7	C7	C8	49	12A1:59	21	1B	08	10	92	81	99	06
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0E01:A9	10	99	98	5F	C8	C0	4C	9E	1061:86	93	93	86	6E	2E	1F	C8	B7	12C1:10	99	1C	86	AD	34	89	9D	2F
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0E11:C0	40	0A	79	A4	C1	40	0A	2D	1071:0E	3C	30	F0	AC	0F	40	0E	EC	12D1:A0	7F	4C	0D	88	77	EC	02	7E
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0E21:40	0A	7C	A4	C4	40	0A	7D	72	1081:F0	F0	3F	33	F3	88	1B	F3	5D	12E1:86	5D	87	28	8F	69	61	D7	D0
0E29:A4	C5	40	0A	7E	A4	C6	BD	83	1089:33	D0	C3	1D	05	FF	62	FF	AE	12E9:E1	16	4C	D6	97	96	31	8A	7F
0E31:00	7F	9D	00	C7	E8	D0	CD	32	1091:3F	3F	60	05	10	C0	20	3F	80	12F1:D6	E0	DD	21	0B	78	73	8C	35
0E39:60	00	F9	D7	3B	82	D0	AD	02	1099:71	3C	CF	C8	C3	CF	CE	43	46	12F9:E0	34	78	AA	A2	23	18	63	8A
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0E49:07	9D	54	DB	E8	E0	0E	D0	50	10A9:FF	00	FC	FC	10	47	01	3C	15	1309:44	3E	0A	4B	23	8F	AE	D2	5E
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0E61:20	4A	C3	74	0E	E0	62	CF	68	10C1:5D	1E	94	2A	E4	21	AC	1C	6E	1321:4F	8A	1A	21	18	05	60	28	A4
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0E79:0F	A0	83	F3	00	B9	04	F3	D7	10D9:24	F8	F8	BC	80	F8	68	05	F2	1339:A2	68	F0	91	4C	03	80	F8	6A
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0EC9:00	05	AE	79	9C	A0	A2	8E	CF	1129:BD	08	F0	0A	DE	81	25	02	34	1389:2C	85	3A	0A	E8	84	0A	00	6A
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0EE1:12	CA	4C	20	83	60	78	8F	63	1141:E6	85	C8	C0	54	D0	F8	1C	51	13A1:05	05	B0	00	0A	0A	0A	0F	3D
0EE9:98	00	83	FB	82	0D	E8	0B	A7	1149:9F	C9	E0	21	80	19	E8	B1	C7	13A9:0F	0F	B0	00	14	14	0A	19	4F
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0EF9:95	08	5A	84	AD	3A	94	A2	2C	1159:F2	85	C8	C8	3C	79	2A	B6	FE	13B9:F5	E0	16	46	0F	67	F1	F0	25
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0F09:2F	22	0F	18	69	03	32	21	87	1169:E6	38	9D	63	6D	C3	2B	86	4E	13C9:A9	86	EE	11	28	04	AD	F4	F6
0F11:40	AD	B3	39	DB	F0	07	69	DE	1171:18	6F	69	4D	D6	8A	0C	FE	75	13D1:8B	CC	43	A2	28	A8	0C	C8	48
0F19:04	0A	28	67	8D	B2	2B	A8	6D	1179:62	34	80	C2	DD	07	26	08	75	13D9:C0	22	FB	CA	A0	1D	F6	60	DC
0F21:8C	D9	E2	6D	D4	A7	69	C3	0B	1181:07	26	10	07	26	43	AD	80	3D	13E1:A2	64	CA	D0	FD	25	78	00	4E
0F29:20	01	F0	20	0F	64	8D	75	52	1189:D9	0A	A8	82	B9	F0	07	86	7E	13E9:A8	84	6C	A8	C0	D3	8C	A9	B5
0F31:0A	C4	C3	83	AD	D0	C9	02	5E	1191:88	88	CC	B9	E7	27	27	28	A1	13F1:02	85	1F	09	9C	40	48	A6	0C
0F39:90	07	00	05	CE	1A	83	42	D9	1199:87	FD	BD	30	C0	A8	FE	A4	05	13F9:53	25	8B	AA	A0	00	BD	A7	57
0F41:A0	EE	AC	82	60	BC	A9	F0	63	11A1:2F	43	00	38	A0	00	B1	FD	16	1401:8B	20	FC	E8	41	4A	87	38	9F
0F49:E0	CE	E0	76	84	A5	7C	22	E4	11A9:F0	09	20	06</														



PROGRAMS

1481:42	6D	77	70	AA	06	0E	DA	80	16E9:60	20	D2	E0	F5	35	6B	8A	9C	1951:71	45	59	11	F7	E1	A1	19	6D	
1489:84	C2	8F	AD	93	8D	D0	06	EB	16F1:20	EB	14	00	29	E0	CA	90	9E	1959:07	6B	F1	B3	09	65	73	80	A8	
1491:83	E7	0B	34	83	16	5E	86	D1	16F9:C2	91	AF	72	CA	72	66	87	7D	1961:14	35	1B	1A	05	42	B1	50	D4	
1499:33	0F	DE	85	20	25	87	9F	97	1701:8A	28	A1	00	02	6A	66	0B	44	1969:80	64	98	CE	48	1B	74	64	F0	
14A1:5E	89	21	CF	94	C1	11	6D	B7	1709:43	14	0E	FA	1A	90	C1	93	79	1971:A4	14	11	B0	93	E1	B0	81	2F	
14A9:20	81	3E	74	20	5F	87	DB	BA	1711:59	A8	F0	20	9A	8D	53	23	DA	1979:90	F1	02	5B	9D	4D	AE	ED	D3	
14B1:C7	3D	74	08	0B	4F	CE	07	56	1719:3B	30	86	20	21	82	3E	31	84	1981:04	99	54	8E	F8	24	C1	48	B3	
14B9:31	91	03	60	CF	4B	59	36	D9	1721:82	F9	87	AB	A9	FF	8D	B8	DB	1989:8C	AE	4F	0C	C0	B0	8F	8E	03	
14C1:8D	00	F8	29	0F	86	ED	8D	5E	1729:B4	22	1C	84	A8	04	46	C0	A8	1991:E6	A9	06	31	0B	16	E0	93	7B	
14C9:97	30	51	78	08	0A	31	04	4A	1731:CC	5D	80	4C	BA	97	75	C8	D9	1999:20	A9	8E	20	12	8F	CD	13	97	
14D1:36	49	E2	15	13	75	84	4F	DB	1739:10	28	04	FE	44	A0	90	FF	AF	19A1:20	8C	69	68	9C	EE	34	1C	DF	
14D9:8E	87	34	51	78	44	05	51	F6	1741:10	07	FF	41	CF	10	01	87	95	19A9:50	05	B2	8C	F2	91	8D	EF	4D	
14E1:8D	20	36	D0	92	31	0F	15	39	1749:E0	00	03	C0	00	01	80	E1	3B	19B1:91	60	A9	72	8D	0C	F1	2F	D0	
14E9:F6	5C	14	22	41	58	16	11	F1	1751:48	27	1E	35	1D	1E	C1	81	EA	19B9:B3	81	A0	14	32	C6	40	28	D0	
14F1:73	20	4F	0C	D0	99	D3	60	7B	1759:91	99	80	5B	C8	C0	80	C4	8B	19C1:08	0C	88	03	42	2C	34	E0	48	
14F9:5D	BB	81	E1	CD	4A	8E	D0	93	1761:70	59	A9	6E	8D	F8	5F	8D	D6	19C9:82	EE	B1	0B	F3	60	BA	22	98	
1501:01	A0	F7	60	05	05	44	E4	82	1769:F9	5F	E1	72	27	0D	0A	8D	DE	19D1:0A	E2	05	78	88	01	60	CE	C1	
1509:15	4C	3E	8E	77	56	70	88	FF	1771:28	81	79	C1	46	60	21	0E	63	19D9:BB	02	20	85	95	4B	02	60	05	
1511:17	4B	8E	4C	23	8E	00	F6	7A	1779:14	26	C2	1D	04	1B	01	00	F3	19E1:A6	75	06	F0	50	4F	06	08	68	
1519:76	91	60	22	21	20	78	1A	5A	1781:00	00	96	3D	74	C4	09	91	B0	19E9:5F	58	BA	F0	36	BD	42	1E	93	
1521:1B	1A	19	E4	19	14	13	12	22	1789:56	1C	06	9C	81	96	42	C1	21	19F1:68	9E	EA	15	79	CA	23	8A	76	
1529:E4	19	0D	0C	0B	E4	19	06	92	1791:20	98	95	A9	21	DB	59	24	92	19F9:8A	EA	F0	13	89	8A	8A	67	6E	
1531:05	64	81	1B	00	B3	00	BD	65	1799:14	83	E0	50	70	03	41	D1	B7	1A01:EA	00	9E	A9	BA	20	60	F8	29	
1539:4A	9A	C9	03	D0	12	E8	1A	53	17A1:0D	1D	4C	1B	10	4A	EC	C3	20	1A09:A6	A2	00	88	1C	28	3E	7C	3C	
1541:F4	D8	30	D4	01	C3	90	AC	54	17A9:5C	E0	8D	13	8D	03	17	11	D8	1A11:2C	0A	84	20	9D	8A	A8	B9	92	
1549:ED	8B	A7	0B	A8	A9	00	99	78	17B1:04	8D	50	A9	64	8D	AA	D9	72	1A19:CA	8B	D2	AD	C1	91	F0	27	28	
1551:CA	8B	60	A9	2E	14	E7	06	02	17B9:C1	43	91	03	25	8A	72	B2	E6	1A21:47	2F	8A	03	78	C8	48	29	E6	
1559:C3	86	1B	BD	8F	A8	6E	15	57	17C1:0F	D0	F8	F7	11	84	04	D0	BD	1A29:01	A0	86	F0	15	BD	99	8F	48	
1561:60	BA	01	43	01	28	0E	72	F5	17C9:C7	07	43	5F	78	C1	A9	03	1D	1A31:8D	BA	BD	5E	8E	CD	B1	95	1D	
1569:28	EA	B4	8E	3A	F0	11	A8	42	17D1:3D	A5	0D	F6	8B	D6	72	E1	97	1A39:D0	0F	BD	76	F8	C9	02	D0	31	
1571:88	42	97	06	1C	63	A0	CD	41	17D9:0C	D1	F5	F3	04	0D	C1	1E	76	1A41:08	E8	E0	23	C0	3A	20	8F	C0	
1579:8E	6B	0E	00	B1	F8	38	61	D6	17E1:87	0A	B0	CF	F1	05	EC	71	58	1A49:96	60	04	00	00	3E	70	C4	FF	
1581:03	4C	F7	E2	80	8C	0E	06	6B	17E9:98	14	EC	19	1F	CE	92	12	04	1A51:05	F0	17	C9	07	F0	13	0C	FA	
1589:02	A9	02	9D	72	C8	E8	C0	82	17F1:07	7B	1C	1D	C0	0E	04	C0	DE	1A59:3E	12	28	0F	C4	86	47	05	FA	
1591:07	D0	E6	84	31	E0	12	20	F6	17F9:5E	A4	64	B0	25	AD	53	02	A0	1A61:40	80	44	86	C7	51	01	A9	F5	
1599:70	2E	01	E0	1E	0A	D5	60	DA	1801:B0	17	29	60	5F	DC	EE	8A	51	1A69:14	8D	62	18	00	50	3C	4C	E2	
15A1:AD	EE	8B	35	2F	0E	06	35	16	1809:AD	80	20	80	FD	E8	3C	F6	3F	1A71:A2	54	2E	CD	39	06	D0	02	34	
15A9:88	89	38	D4	0E	C3	01	D0	F1	1811:05	01	D8	17	28	60	9F	29	BB	1A79:A9	44	8D	5D	96	C0	37	E2	24	
15B1:1B	C3	5E	BD	72	3C	0C	EA	21	1819:C3	90	61	9F	D1	CE	22	2D	B0	1A81:F0	28	0A	E2	20	99	01	DC	ED	
15B9:30	5E	42	C9	02	D0	11	3C	2A	1821:1B	0C	03	CE	D5	7E	B1	12	4D	1A89:29	10	D0	D7	AE	5F	96	AC	BA	
15C1:21	30	14	8A	8C	9A	79	6C	8E	1829:C7	7E	06	0C	EC	17	1C	B0	0B	1A91:5E	96	AD	B2	81	20	04	AB	BB	
15C9:F4	60	32	A2	2A	B9	45	8B	45	1831:9F	27	C3	50	EC	41	93	EE	FA	1A99:43	00	15	D0	20	72	81	6E	58	
15D1:9D	76	8B	C8	8A	33	EE	02	67	1839:EF	09	C0	11	EC	03	EE	13	31	1A91:68	68	00	09	20	08	8C	AD	9C	
15D9:AA	B0	F2	18	69	32	AA	C9	98	1841:00	10	02	AD	82	00	00	20	C4	1A99:94	0D	C9	04	F0	07	C9	06	22	
15E1:31	14	AF	04	42	E4	C8	03	1A	1849:E9	0F	E7	A1	00	80	F3	91	C4	1AB1:F0	03	C2	19	8A	E9	AD	66	C6	
15E9:62	C4	03	E1	8E	81	8C	00	88	1851:BD	7C	FD	9D	72	0F	FA	EF	CE	1AB9:0A	40	CC	0B	10	99	00	A0	D4	
15F1:EA	EA	EA	FB	07	3A	34	99	8C	1859:39	46	01	0A	8F	51	06	20	66	1AC1:10	70	44	98	40	76	28	44	9C	
15F9:7E	8F	98	99	76	C9	23	D0	E1	1861:17	8C	90	F6	CE	0D	D4	4A	60	1AC9:50	40	04	78	44	A0	40	04	67	
1601:EF	F2	30	80	F8	D8	40	80	1C	1869:0E	54	AD	00	DC	A8	39	25	8C	1AD1:C8	44	F0	5C	99	18	00	05	91	
1609:8F	39	04	8D	C4	05	3E	32	8D	1871:0C	8C	4A	8D	13	20	5C	94	53	1AD9:40	44	68	40	04	90	44	B8	F3	
1611:3C	0E	1F	72	16	AD	1B	D4	5C	1879:6E	69	85	01	D0	22	89	99	B7	1AE1:40	04	E0	5D	99	08	50	30	D3	
1619:29	03	18	6D	0A	2E	8D	20	B8	1881:50	F0	1B	CE	64	7E	CE	C8	E9	1AE9:40	04	A0	59	99	80	8C	04	A8	D6
1621:17	AA	22	4B	14	E0	3E	0E	2B	1889:4C	1C	5A	30	1F	23	33	38	59	1AF1:44	D0	40	04	F8	5E	99	20	59	
1629:85	E0	60	44	C0	42	B1	3B	4E	1891:CD	4C	E9	33	13	C7	2F	AD	EF	1AF9:5F	99	48	5F	CA	C8	8C	37	0D	
1631:BC	38	08	AE	C1	8F	AD	BE	1C	1899:0D	4D	C9	E6	D0	0D	20	E6	2D	1B01:D0	B2	60	5A	CA	1C	04	1B	E7	
1639:B9	2A	C0	14	D0	9D	AD	BB	3A	18A1:85	FD	CF	03	9E	A4	81	AD	76	1B09:0C	71	2C	64	78	2C	C4	01	6C	
1641:06	F0	06	C4	5F	F0	60	48	81	18A9:80	20	C9	20	D0	0E	60	5A	37	1B11:01	45	B0	01	13	03	03	03	EC	
1649:15	61	78	6C	04	E1	00	9C	72	18B1:EB	91	18	AD	49	69	07	8D	A5	1B19:A0	00	B9	53	97	99	76	8B	AE	
1651:A0	04	B9	26	9D	20	84	60	3F	18B9:60	2D	20	03	C9	2E	C2	90	B6	1B21:C8	C0	31	D0	F5	20	A0	8A	1B	
1659:EC	29	0D	D0	F3	18	8A	28	32	18C1:32	23	B3	CE	23	B3	11	91	D2	1B29:60	FF	00	E0	7D	63	0E	83	B6	
1661:AA	69	04	60	2A	AD	42	00	50	18C9:01	29	FD	53	C1	CE	34	30	9B	1B31:39	0C	E6	58	5E	5F	0F	AF	A7	



PROGRAMS

G U S V A K A L I S

Termite has infested Kelvin's four-story walkup, and the building is starting to collapse. Kelvin can escape this crushing fate if you help him jump over holes that appear in his path.

Termite is in three parts: a BASIC loader, a machine language sprite file that contains 13 sprite definitions, and the main program, which is written entirely in machine language. To avoid typing mistakes, enter the boot program with *The Automatic Proofreader* (see "Typing Aids" elsewhere in this section). When you've finished typing, save a copy of the program to disk.

To enter the sprite data and the main program, you'll need to use *MLX*, our machine language entry program (see "Typing Aids"). When *MLX* prompts you, respond with the values given below.

Starting address: 3000

Ending address: 3337

Before exiting *MLX*, save a copy of the sprite data with the name T.SPR.

The second machine language program is the main *Termite* program. Again, use *MLX* to type it in. When *MLX* prompts you, respond with the following values.

Starting address: C000

Ending address: CC47

When you've finished typing, be sure to save a copy of the program as T.PRG. Be certain you've saved the two programs with the names T.SPR and T.PRG, as these are the names the boot program looks for when it runs.

Playing the Game

When the game first begins, Kelvin is standing in the doorway of his fourth-floor apartment. Press the space bar to start him on his dash to safety. As he runs along, holes open up before him. To jump the holes, press the space bar. If you jump too soon, he won't clear the hole; wait too long, and it

will be too late. Since the space bar controls this game, young children especially should find it easy to play.

The game is divided into four skill levels, with four frames per level. As you progress from frame to frame within each level, you'll find more holes opening, and opening closer together. You'll have to make some quick successive jumps to clear them. As you progress through the four skill levels, you'll find the holes opening up closer to Kelvin's feet. This means you'll have less time to react.

You'll receive 100 points for each hole that you jump, and you'll get bonus points when you successfully

TERMITES
JUMP TO SAFETY IN
THIS GAME FOR THE
64 AS TERMITES FEED
ON YOUR
FLOORBOARDS

complete a frame. The bonus will be equal to the frame number multiplied by the skill level times 100. For example, if you complete frame 1 of level 1, you'll receive 100 bonus points. If you complete frame 4 of level 2, you'll receive an 800-point bonus.

Begin at any skill level; you'll progress automatically as you complete each level. Should Kelvin fall into a hole, the game ends, and the high score and your score will be displayed. You'll also be prompted to play another game or exit to BASIC.

One neat trick: The program monitors the sprite's x-position and triggers the sprite-to-background priority register to make Kelvin appear in front of apartment doors but disappear into stairways.

TERMITES

```
SF 10 POKE53280,0:POKE53281,0
MB 20 PRINT"{CLR}{5 DOWN}{YEL}
"
XJ 30 PRINT"{3 SPACES}UCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCC
CCI"
DQ 40 PRINT"{3 SPACES}-{RED}
{8 SPACES}T E R M I T E
{SPACE}S !{7 SPACES}
{YEL} -"
BX 50 PRINT"{3 SPACES}-
{33 SPACES}-"
EK 60 PRINT"{3 SPACES}-{BLU}
{9 SPACES}COPYRIGHT 1991
{10 SPACES}{YEL}-"
DG 70 PRINT"{3 SPACES}-{BLU}
{2 SPACES}COMPUTE PUBLIC
ATIONS INTL LTD
{2 SPACES}{YEL}-"
SP 80 PRINT"{3 SPACES}JCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCC
CCK"
FM 90 PRINT"{2 DOWN}{5 RIGHT}
{RED}{WHT} LOADING GAME
- PLEASE WAIT{RED} )"
SR 100 IF A=0THENA=1:LOAD"T.PR
G",8,1
FH 110 IF A=1THENA=2:LOAD"T.SP
R",8,1
CP 120 SYS49152
```

T.SPR

```
3000:00 00 00 00 14 00 00 5C 5D
3008:00 00 53 00 00 7C 00 00 C4
3010:30 00 00 20 00 00 28 00 DA
3018:00 28 00 00 28 00 00 28 EB
3020:00 00 2B 00 00 2C 00 00 96
3028:14 00 00 14 00 00 14 00 FB
3030:00 14 00 00 14 00 00 14 4A
3038:00 00 3F 00 00 30 00 00 41
3040:00 00 00 00 14 00 00 5C 9D
3048:00 00 53 00 00 7C 00 00 05
3050:30 00 00 20 00 00 28 00 1B
3058:00 A8 00 00 80 00 00 AB 92
3060:00 00 20 00 00 20 00 00 45
3068:14 00 00 14 00 00 11 00 36
3070:00 11 00 00 51 00 03 41 E6
3078:00 03 03 00 03 03 C0 00 9F
3080:00 14 00 00 5C 00 00 53 1C
3088:00 00 7C 00 00 30 00 00 39
3090:20 00 00 28 00 00 28 00 D3
3098:00 28 00 00 20 00 00 2A 2E
30A0:00 00 2B 00 00 14 00 00 B6
30A8:14 00 00 14 00 00 05 00 5E
30B0:00 01 00 00 35 00 00 34 2F
30B8:00 00 3C 00 00 0F 00 00 DC
30C0:00 00 00 00 14 00 00 5C 1E
30C8:00 00 53 00 00 7C 00 00 85
30D0:30 00 00 20 00 00 28 00 9B
30D8:00 28 00 00 28 00 00 2A AE
30E0:C0 00 3A 00 00 28 00 00 89
30E8:14 00 00 14 00 00 05 00 9E
30F0:00 11 00 00 53 00 00 C3 F3
30F8:00 00 F3 00 00 00 00 00 D7
3100:00 14 00 00 5C 00 00 53 9D
```




PROGRAMS

```

3108:00 00 7C 00 00 30 00 00 BA
3110:20 00 00 28 00 00 A8 00 56
3118:00 A8 B0 00 8A 80 00 EA FB
3120:00 00 28 00 00 14 00 00 D7
3128:14 00 00 05 00 00 51 40 C7
3130:01 40 40 01 00 40 00 00 56
3138:00 0C 00 F0 03 00 00 25
3140:00 14 00 00 5C 00 00 53 DD
3148:00 00 7C 00 00 30 00 00 FA
3150:20 00 00 28 B0 00 AA 80 A0
3158:02 AA 00 02 28 00 03 28 F5
3160:00 00 28 00 00 15 00 00 1C
3168:05 40 3D 10 50 0D 50 30 8D
3170:00 00 3C 00 00 00 00 00 5A
3178:00 00 00 00 00 00 00 00 DA
3180:00 00 00 00 14 00 00 35 B8
3188:00 00 C5 00 00 3D 00 00 98
3190:0C 00 00 08 00 00 28 00 C9
3198:00 2A 00 00 02 00 00 EA 80
31A0:00 00 08 00 00 00 00 24
31A8:14 00 00 14 00 00 44 00 DE
31B0:00 44 00 00 45 00 00 41 8F
31B8:00 00 C0 C0 03 C0 C0 00 3C
31C0:00 14 00 00 35 00 00 C5 97
31C8:00 00 3D 00 00 0C 00 00 03
31D0:08 00 00 28 00 00 28 00 0A
31D8:00 28 00 00 08 00 00 A8 2E
31E0:00 00 E8 00 00 14 00 00 B0
31E8:14 00 00 14 00 00 50 00 37
31F0:00 40 00 00 5C 00 00 1C 62
31F8:00 00 3C 00 00 F0 00 00 A6
3200:00 00 00 00 14 00 00 35 3A
3208:00 00 C5 00 00 3D 00 00 1A
3210:0C 00 00 08 00 00 28 00 4B
3218:00 28 00 00 28 00 03 A8 76
3220:00 00 AC 00 00 28 00 00 BA
3228:14 00 00 14 00 00 50 00 78
3230:00 44 00 00 C5 00 00 C3 97
3238:00 00 CF 00 00 00 00 00 96
3240:00 14 00 00 35 00 00 C5 19
3248:00 00 3D 00 00 0C 00 00 84
3250:08 00 00 28 00 00 2A 00 8F
3258:0E 2A 00 02 A2 00 00 AB 2F
3260:00 00 28 00 00 14 00 00 1A
3268:14 00 00 50 00 01 45 00 6A
3270:01 01 40 01 00 40 03 00 B4
3278:70 0F 00 30 00 00 C0 00 5D
3280:00 14 00 00 35 00 00 C5 59
3288:00 00 3D 00 00 0C 00 00 C4
3290:08 00 0E 28 00 02 AA 00 9A
3298:00 AA 80 00 28 00 00 28 23
32A0:C0 00 28 00 00 54 00 01 BC
32A8:50 00 05 04 7C 0C 05 70 A4
32B0:3C 00 00 00 00 00 00 33
32B8:00 00 00 00 00 00 00 1D
32C0:00 50 00 01 70 00 01 4C 1B
32C8:00 01 F0 00 00 C0 00 00 8E
32D0:80 00 00 A0 00 02 A0 00 C8
32D8:02 21 30 00 E5 70 00 54 D1
32E0:70 00 50 00 00 00 00 87
32E8:00 00 00 00 00 00 00 4D
32F0:00 00 00 00 00 00 00 55
32F8:00 00 00 00 00 00 00 5D
3300:00 05 00 00 0D 40 00 31 42
3308:40 00 0F 40 00 03 00 00 80
3310:02 00 00 0A 00 00 0A 80 AC
3318:0C 48 80 0D 5B 00 0D 15 81
3320:00 00 05 00 00 00 00 27
3328:00 00 00 00 00 00 00 8E
3330:00 00 00 00 00 00 00 96
3338:00 00 00 00 00 00 00 9E

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T.PRQ

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C000:A9 80 8D 91 02 AD 14 03 33
C008:8D 07 CC AD 15 03 8D 08 5E
C010:CC AD 28 03 8D 09 CC AD 70
C018:29 03 8D 0A CC 78 A9 EF CC

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C020:8D 14 03 A9 C8 8D 15 03 12
C028:A9 FA 8D 28 03 A9 F6 8D AB
C030:29 03 58 A9 00 8D 2D CC 0A
C038:8D 2C CC 8D 20 D0 8D 21 7E
C040:D0 A9 AB 85 BC A9 8D 28
C048:BD A9 05 8D 1A CC A9 06 E9
C050:8D 1B CC A9 31 8D 23 CC 66
C058:A9 93 20 D2 FF A9 30 8D 59
C060:1C CC 8D 1D CC 8D 1E CC 4C
C068:A9 31 8D 22 CC A9 04 8D 81
C070:28 CC A9 50 8D 30 CC A9 E3
C078:FF 8D 0E CC A9 B4 8D 32 59
C080:CC A9 00 8D 0C CC 8D 16 70
C088:CC 8D 15 CC 8D 18 CC 8D 37
C090:0D CC 8D 0F CC 8D 24 CC 20
C098:8D 27 CC 8D 2E CC 8D 2F 0C
C0A0:CC 8D 31 CC 8D 10 D0 8D BA
C0A8:1B D0 A9 50 8D 17 CC 8D 16
C0B0:00 D0 A9 C1 8D 0B CC 8D 77
C0B8:10 CC A9 C6 8D 11 CC A9 0B
C0C0:40 8D 14 CC A9 C0 8D F8 79
C0C8:07 A9 06 8D 27 D0 A9 09 AA
C0D0:8D 25 D0 A9 07 8D 26 D0 A2
C0D8:A9 54 8D 01 D0 A9 01 8D C2
C0E0:12 CC 8D 13 CC 8D 1C D0 27
C0E8:20 E3 C8 A9 50 8D 0C D4 B4
C0F0:A9 21 8D 01 D4 A9 44 8D B4
C0F8:05 D4 A9 20 8D 06 D4 A9 41
C100:68 8D 16 D4 A9 01 8D 17 AE
C108:D4 A9 4A 8D 18 D4 A9 C8 B2
C110:8D 08 D4 A9 FF 8D 0E D4 B8
C118:8D 0F D4 A9 80 8D 12 D4 8E
C120:A2 00 BD 27 C9 9D 02 04 EB
C128:A9 06 9D 02 D8 E8 0E 24 26
C130:D0 F0 AD 1E CC 8D 09 04 A2
C138:AD 1D CC 8D 0A 04 AD 1C 24
C140:CC 8D 0B 04 AD 23 CC 8D 50
C148:19 04 AD 22 CC 8D 25 04 1C
C150:18 A0 00 A2 01 20 F0 FF 9C
C158:A2 00 BD E1 C9 2D D2 FF 77
C160:E8 E0 56 D0 F5 18 A0 00 B9
C168:A2 03 20 F0 FF A2 00 BD 59
C170:37 CA 20 D2 FF E8 E0 DA B3
C178:D0 F5 AD 32 CC 8D D0 04 FC
C180:8D E6 04 18 A0 00 AD 07 D7
C188:20 F0 FF A2 00 BD 37 CA B2
C190:20 D2 FF E8 E0 DA D0 F5 71
C198:CE 32 CC AD 32 CC 8D 70 D4
C1A0:05 8D 86 05 18 A0 00 A2 11
C1A8:0B 20 F0 FF A2 00 BD 37 9F
C1B0:CA 20 D2 FF E8 E0 DA D0 4D
C1B8:F5 CE 32 CC AD 32 CC 8D 5B
C1C0:10 06 8D 26 06 18 A0 00 B3
C1C8:A2 0F 20 F0 FF A2 00 BD BC
C1D0:37 CA 20 D2 FF E8 E0 DA 14
C1D8:D0 F5 CE 32 CC AD 32 CC 8D
C1E0:8D B0 06 8D C6 06 18 A0 10
C1E8:00 AD 13 20 F0 FF A2 00 46
C1F0:BD 11 CB 20 D2 FF E8 E0 5C
C1F8:F6 D0 F5 A9 EF 8D BF 07 C1
C200:A9 0B 8D BF DB AD 2C CC 85
C208:D0 03 4C E8 C6 A9 01 8D 3B
C210:15 D0 A5 C5 C9 3C D0 FA 41
C218:8D 14 CC A9 00 8D 0E CC BC
C220:AD 29 CC F0 06 CE 29 CC F9
C228:4C 30 C2 A9 80 8D 04 D4 E9
C230:AD 10 D0 29 01 F0 FF AD D4
C238:00 D0 4A 4A 18 69 1E 83
C240:8D 19 CC 4C 68 C2 AD 12 EC
C248:CC 19 FF D0 F0 38 AD 00 68
C250:D0 E9 0C 4A 4A 4A 8D 19 8E
C258:CC 4C 68 C2 38 AD 00 D0 D9
C260:E9 10 4A 4A 8D 19 CC 54
C268:AE 13 CC 18 AD 17 CC 69 F1
C270:A0 8D 17 CC AD 18 CC 69 2A
C278:00 8D 18 CC CA D0 EC 18 BC
C280:AD 17 CC 6D 19 CC 8D 17 41
C288:CC AD 18 CC 69 00 8D 18 2E

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C290:CC 18 A9 04 6D 18 CC 8D EA
C298:18 CC AD 17 CC 85 B8 AD 20
C2A0:18 CC 85 B9 A9 50 8D 17 72
C2A8:CC A9 00 8D 18 CC A0 28 35
C2B0:B1 B8 C9 20 D0 28 A9 FF F2
C2B8:8D 0F CC AD 0D CC D0 26 A0
C2C0:EE 16 CC AD 12 CC C9 FF 0F
C2C8:F0 0A AD 16 CC C9 04 D0 C6
C2D0:15 4C 4F C5 AD 16 CC C9 63
C2D8:08 D0 0B 4C 4F C5 AD 0F B8
C2E0:CC F0 03 20 AF C4 A0 00 3D
C2E8:AD 1B D4 D9 33 CC F0 09 FB
C2F0:C8 CC 28 CC D0 F2 4C 7F 4A
C2F8:C3 AD 2F CC CD 30 CC 10 57
C300:03 4C 7F C3 AD 12 CC C9 61
C308:FF F0 11 18 A5 B8 6D 1A 74
C310:CC 85 BA A5 B9 E9 00 85 0A
C318:BB 4C 2A C3 38 A5 B8 ED C9
C320:1B CC 85 BA A5 B9 E9 00 AC
C328:85 BB A0 28 B1 BA C9 66 6A
C330:D0 4D C8 B1 BA C9 66 D0 42
C338:46 AD 12 CC C9 FF F0 08 95
C340:A0 27 B1 BA C9 20 F0 37 AB
C348:A0 2A B1 BA C9 20 F0 2F 6C
C350:A0 28 A9 20 91 BA C8 91 04
C358:BA A0 00 B1 BA C9 64 D0 17
C360:04 A9 20 91 BA C8 B1 BA 88
C368:C9 64 D0 04 A9 20 91 BA F3
C370:A9 81 8D 04 D4 A9 00 8D F9
C378:2F CC A9 02 8D 29 CC AD 78
C380:12 CC C9 FF F0 2A AD 10 19
C388:D0 F0 0B AD 00 D0 C9 2D F4
C390:F0 16 C9 3D F0 3C AD 00 F6
C398:D0 C9 2A F0 03 4C 08 C4 6D
C3A0:A9 00 8D 1B D0 4C 08 C4 EC
C3A8:A9 01 8D 1B D0 4C 08 C4 35
C3B0:AD 10 D0 D0 0B AD 00 D0 1A
C3B8:C9 2A F0 EC C9 1A F0 12 47
C3C0:AD 00 D0 C9 2D F0 03 4C 55
C3C8:08 C4 A9 00 8D 1B D0 4C 81
C3D0:08 C4 AD 0D CC F0 03 4C 90
C3D8:36 C5 18 AD 01 D0 69 20 09
C3E0:8D 01 D0 EE 13 CC AD 10 AF
C3E8:D0 D0 10 A9 C1 8D 0B CC D0
C3F0:8D 10 CC A9 C6 8D 11 CC D2
C3F8:4C 08 C4 A9 C6 8D 0B CC 2B
C400:8D 10 CC A9 CB 8D 11 CC 0C
C408:AD 13 CC 29 01 F0 08 A9 DE
C410:01 8D 12 CC 4C 1C C4 A9 92
C418:FF 8D 12 CC A5 C5 C9 3C 28
C420:D0 1A 4C F0 C4 AD 12 CC CF
C428:C9 FF F0 08 A9 01 8D 10 B1
C430:D0 4C 45 C4 A9 00 8D 10 A2
C438:D0 4C 45 C4 A9 00 D0 F0 32
C440:E4 C9 FF F0 E0 18 AD 00 80
C448:D0 6D 12 CC 8D 00 D0 EE A1
C450:2F CC AD 0D CC F0 1E EE 80
C458:15 CC AD 15 CC C9 14 D0 2D
C460:30 A9 00 8D 15 CC 8D 0D 49
C468:CC 18 AD 01 D0 69 08 8D ED
C470:01 D0 4C 91 C4 A9 80 8D AC
C478:0B D4 EE 2E CC AD 2E CC C3
C480:C9 0A F0 03 4C 91 C4 A9 9B
C488:00 8D 2E CC C9 A9 81 8D 0B 81
C490:D4 AD 13 CC C9 05 F0 0D 70
C498:A2 0A 00 FF 88 D0 FD CA 58
C4A0:D0 F8 4C 20 C2 AD 00 D0 F9
C4A8:C9 A8 D0 EC 4C DF C5 AD 45
C4B0:1C CC C9 39 F0 06 EE 1C E1
C4B8:CC 4C E5 C4 A9 30 8D 10 0A
C4C0:CC EE 1D CC AD 1D CC C9 22
C4C8:3A F0 03 4C E5 C4 A9 30 96
C4D0:8D 1D CC EE 1E CC AD 1E 8E
C4D8:CC C9 3A F0 03 4C E5 C4 6B
C4E0:A9 30 8D 1E CC AD 1E CC 05
C4E8:8D 09 04 AD 1D CC 8D 0A 18
C4F0:04 AD 1C CC 8D 0B 04 A9 82
C4F8:00 8D 0F CC 60 AD 14 CC 43

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PROGRAMS

C500:C9	40	D0	27	AD	15	CC	D0	39	C770:A9	07	8D	F5	D8	8D	12	D9	A2	C9E0:20	92	97	20	12	A9	CF	D0	C5
C508:22	A9	FF	8D	0D	CC	8D	14	B2	C778:8D	35	DA	8D	52	DA	A2	00	93	C9E8:CF	D0	CF	D0	CF	D0	CF	D0	D1
C510:CC	A9	00	8D	16	CC	AD	12	96	C780:A9	20	9D	1E	05	9D	46	05	B2	C9F0:CF	D0	CF	D0	CF	D0	CF	D0	D9
C518:CC	C9	01	F0	11	A9	CC	8D	02	C788:9D	6E	05	9D	96	05	9D	BE	BF	C9F8:CF	D0	CF	D0	CF	D0	CF	D0	E1
C520:F8	07	38	AD	01	D0	E9	08	F2	C790:05	9D	E6	05	9D	0E	06	A9	12	CA00:CF	D0	CF	D0	CF	D0	CF	D0	EA
C528:8D	01	D0	4C	3C	C4	A9	CB	AD	C798:06	9D	1E	D9	9D	46	9D	4B		CA08:CF	D0	DF	92	20	97	12	A9	0C
C530:8D	F8	07	4C	22	C5	18	AD	6C	C7A0:6E	D9	9D	96	D9	9D	BE	D9	97	CA10:AF	AF	AF	AF	AF	AF	AF	AF	A5
C538:01	D0	69	08	8D	01	D0	A9	E1	C7A8:9D	E6	D9	9D	0E	DA	E8	E0	64	CA18:AF	AF	AF	AF	AF	AF	AF	AF	AD
C540:00	8D	0D	CC	8D	15	CC	A9	A1	C7B0:1C	D0	CD	AD	2C	CC	D0	1D	6A	CA20:AF	AF	AF	AF	AF	AF	AF	AF	B5
C548:40	8D	14	CC	4C	DA	C3	A9	A5	C7B8:A2	00	BD	B6	C9	9D	24	05	CE	CA28:AF	AF	AF	AF	AF	AF	AF	AF	BD
C550:FF	8D	0D	CC	A9	00	8D	16	2C	C7C0:E8	E0	11	D0	F5	A2	00	BD	24	CA30:AF	AF	AF	AF	AF	AF	DF	1C	92
C558:CC	EE	01	D0	EE	16	CC	A2	3F	C7C8:C7	C9	9D	47	05	E8	E0	1A	7E	CA38:12	AF	AF	BA	1F	92	A6	A6	9B
C560:05	A0	FF	88	D0	FD	CA	D0	04	C7D0:D0	F5	4C	EF	C7	A2	00	BD	55	CA40:A6	A6	A6	A6	A6	A6	A6	A6	D5
C568:F8	AD	16	CC	C9	20	D0	E9	C5	C7D8:4B	C9	9D	1F	05	E8	E0	15	C8	CA48:A6	A6	A6	A6	A6	A6	A6	A6	DD
C570:AD	12	CC	C9	FF	F0	08	A9	0B	C7E0:D0	F5	A2	00	BD	C9	9D	4B		CA50:A6	A6	A6	A6	A6	A6	A6	A6	E5
C578:CB	8D	F8	07	4C	84	C5	A9	86	C7E8:47	05	E8	E0	15	D0	F5	A2	03	CA58:A6	A6	A6	A6	A6	A6	A6	A6	ED
C580:CC	8D	F8	07	18	AD	01	D0	AF	C7F0:00	BD	75	C9	9D	97	05	E8	79	CA60:1C	12	CC	AF	AF	12	1C	BA	D5
C588:69	A0	8D	01	D0	A2	90	A0	DE	C7F8:E0	1B	D0	F5	A2	00	BD	90	5A	CA68:9A	20	20	92	20	20	20	20	B5
C590:FF	88	D0	FD	CA	D0	F8	20	E3	C800:C9	9D	E7	05	E8	E0	11	D0	E8	CA70:A7	12	1E	CF	B7	B7	D0	92	EF
C598:E3	C8	A9	B0	8D	01	D4	A9	4C	C808:F5	A2	00	BD	A1	C9	9D	0F	97	CA78:95	B4	20	20	20	20	20	20	ED
C5A0:50	8D	0F	D4	A9	0F	8D	18	A3	C810:06	E8	E0	15	D0	F5	A9	02	FF	CA80:20	20	20	20	20	20	20	20	16
C5A8:D4	A9	20	8D	04	D4	A9	29	D5	C818:8D	98	D9	8D	E8	D9	8D	10	84	CA88:20	20	A7	12	1E	CF	B7	B7	A3
C5B0:8D	04	D4	A2	0D	A0	FF	88	3C	C820:DA	AC	2D	CC	A9	07	91	BC	06	CA90:D0	92	95	B4	20	20	20	12	05
C5B8:D0	FD	CA	D0	F8	EE	31	CC	45	C828:AD	2C	CC	D0	08	A9	FF	8D	B6	CA98:9A	20	20	1C	CC	12	1C	BA	EA
C5C0:AD	31	CC	C9	16	D0	E2	20	7F	C830:2C	CC	4C	8B	C8	AD	1E	CC	53	CAA0:9A	20	20	92	20	20	20	95	10
C5C8:E3	C8	A9	00	8D	24	CC	8D	D1	C838:CD	21	CC	30	2A	F0	02	10	BE	CAA8:A7	12	1E	B4	30	41	A7	92	0E
C5D0:25	CC	EE	24	CC	D0	FB	EE	D2	C840:14	AD	1D	CC	CD	20	CC	30	70	CAB0:95	B4	20	20	20	20	20	20	26
C5D8:25	CC	D0	F6	4C	E8	C6	AD	F4	C848:1E	F0	02	10	08	AD	1C	CC	62	CAB8:20	20	A7	20	20	20	20	20	4E
C5E0:D0	CC	F0	09	18	AD	01	D0	1F	C850:CD	1F	CC	30	12	AD	1E	CC	7D	CAC0:20	20	A7	12	1E	B4	30	42	EA
C5E8:69	08	8D	01	D0	A9	FF	8D	A7	C858:8D	21	CC	AD	1D	CC	8D	20	C4	CAC8:A7	92	95	B4	20	20	20	12	A8
C5F0:0D	CC	A9	C0	8D	F8	07	A9	7F	C860:CC	AD	1C	CC	8D	1F	CC	AD	44	CAD0:9A	20	20	1C	CC	12	1C	BA	23
C5F8:00	8D	2A	CC	AD	22	CC	29	B2	C868:21	CC	8D	2F	05	AD	20	CC	4E	CAD8:9A	AF	AF	92	9E	A4	A4	A4	3C
C600:0F	AA	AD	23	CC	29	0F	8D	5E	C870:8D	30	05	AD	1F	CC	8D	31	C8	CAE0:95	BA	12	1E	CC	AF	AF	BA	53
C608:2B	CC	F8	18	AD	2A	CC	6D	1C	C878:05	AD	1E	CC	8D	57	05	AD	0A	CAE8:92	95	CC	9E	A4	A4	A4	A4	56
C610:2B	CC	2A	CC	CA	CA	D0	F3	E1	C880:1D	CC	8D	58	05	AD	1C	CC	EE	CAF0:A4	A4	A4	A4	A4	A4	A4	A4	86
C618:D8	AD	2A	CC	4A	4A	4A	4A	E9	C888:8D	59	05	A5	C5	C9	0D	F0	92	CAF8:A4	A4	A4	A4	95	BA	12	1E	C2
C620:F0	05	09	30	8D	60	07	AD	35	C890:0B	C9	29	F0	48	C9	17	F0	D6	CB00:CC	AF	AF	BA	92	95	CC	9E	AE
C628:2A	CC	29	0F	09	30	8D	61	99	C898:47	4C	8B	C8	AC	2D	CC	A9	3C	CB08:A4	A4	A4	12	9A	AF	AF	1C	DF
C630:07	A9	30	8D	62	07	8D	63	38	C8A0:06	91	BC	CE	1A	CC	CE	1B	DA	CB10:CC	1C	12	AF	AF	BA	1F	92	8B
C638:07	A9	01	8D	60	DB	8D	61	9B	C8A8:CC	EE	23	CC	EE	2D	CC	EE	42	CB18:A6	A6	A6	A6	A6	A6	A6	A6	AF
C640:DB	8D	62	DB	8D	63	DB	A9	84	C8B0:2D	CC	AD	2D	CC	C9	08	90	C2	CB20:A6	A6	A6	A6	A6	A6	A6	A6	B7
C648:78	8D	08	DA	A9	09	8D	0C	5C	C8B8:14	A9	00	8D	2D	CC	A9	05	8C	CB28:A6	A6	A6	A6	A6	A6	A6	A6	BF
C650:D4	A9	04	8D	0D	D4	A9	21	3C	C8C0:8D	1A	CC	A9	06	8D	1B	CC	3D	CB30:A6	A6	A6	A6	A6	A6	A6	A6	C7
C658:8D	0F	D4	A9	15	8D	0B	D4	6F	C8C8:A9	31	8D	23	CC	AC	2D	CC	9F	CB38:A6	A6	1C	12	CC	AF	AF	12	08
C660:A9	00	8D	24	CC	8D	25	CC	6A	C8D0:A9	07	91	BC	A5	C5	C9	40	0F	CB40:1C	BA	9A	20	20	20	20	20	95
C668:8D	26	CC	EE	24	CC	D0	FB	C0	C8D8:D0	FA	4C	8B	C8	4C	58	C0	BC	CB48:20	20	20	20	20	20	20	20	DF
C670:EE	25	CC	D0	F6	EE	26	CC	F1	C8E0:20	E2	FC	A9	00	AA	9D	00	5B	CB50:20	20	20	95	A7	12	9F	CF	F1
C678:AD	26	CC	C9	02	D0	EC	F8	C2	C8E8:D4	E8	E0	19	D0	F8	60	AD	A5	CB58:B7	D0	B7	B7	D0	92	95	B4	23
C680:38	AD	2A	CC	E9	01	8D	2A	40	C8F0:0E	CC	D0	22	AD	0D	CC	D0	05	CB60:20	20	20	20	20	20	20	20	F7
C688:CC	D8	20	AF	C4	AD	2A	CC	AF	C8F8:1D	EE	0C	CC	AD	0C	CC	C9	24	CB68:20	20	20	20	20	12	9A	20	BC
C690:D0	ED	AD	22	CC	C9	34	D0	AF	C900:03	D0	13	EE	0B	CC	AD	0B	8C	CB70:20	1C	CC	12	1C	BA	9A	20	FA
C698:2B	AD	23	CC	C9	34	D0	03	1C	C908:CC	AD	11	CC	F0	10	8D	F8	40	CB78:20	92	20	20	20	20	20	20	AC
C6A0:4C	D9	C6	CE	1A	CC	CE	1B	4D	C910:07	A9	00	8D	0C	CC	A5	C5	0F	CB80:20	20	20	20	20	20	20	20	8D
C6A8:CC	A9	04	8D	28	CC	A9	50	78	C918:8D	14	CC	4C	31	EA	AD	10	76	CB88:A7	12	9F	B4	4C	A7	B4	4C	6E
C6B0:8D	30	CC	A9	31	8D	22	CC	16	C920:CC	8D	0B	CC	4C	0E	C9	13	EC	CB90:A7	92	95	B4	20	20	20	20	80
C6B8:EE	23	CC	EE	2D	CC	EE	2D	B6	C928:03	F0	12	05	3A	20	30	30	76	CB98:20	20	20	20	20	20	20	20	30
C6C0:CC	4C	D9	C6	18	AD	28	CC	04	C930:30	F0	30	20	20	20	20	0C	BD	CBA0:20	12	9A	20	20	1C	CC	12	3F
C6C8:69	04	8D	28	CC	38	AD	30	13	C938:05	16	05	0C	3A	20	30	20	08	CBA8:1C	BA	9A	AF	AF	92	9E	A4	F4
C6D0:CC	E9	18	8D	30	CC	EE	22	CF	C940:20	20	20	06	12	01	0D	05	04	CBB0:A4	A4	A4	A4	A4	A4	A4	A4	48
C6D8:CC	AD	23	CC	8D	19	04	AD	EF	C948:3A	20	30	08	09	07	08	20	1C	CBB8:A4	A4	A4	A4	95	BA	12	9F	06
C6E0:22	CC	8D	25	04	4C	77	C0	B7	C950:13	03	F0	12	05	20	09	13	FE	CBC0:CC	AF	BA	AF	AF	BA	92	95	20
C6E8:A9	00	8D	15	D0	A2	00	A9	09	C958:20	3A	20	30	30	30	30	30	64	CBC8:CC	9E	A4	A4	A4	A4	A4	A4	F2
C6F0:43	9D	F6	04	8D	36	06	A9	22	C960:19	0F	15	12	20	13	03	0F	6A	CBD0:A4	A4	A4	A4	A4	A4	A4	A4	D5
C6F8:07	9D	F6	08	9D	36	DA	E8	42	C968:12	05	20	09	13	20	3A	20	88	CBD8:9A	AF							



PROGRAMS

G U S T A V O F E L I X H E R R E R A

Have you ever created graphics with *Print Master* and then wanted to use them with GEOS? Maybe a certain graphic from *The Print Shop* has caught your eye, and you'd like to incorporate it into a GeoWrite file. If you've ever wished for these capabilities, then *Graphics Converter* is the program for you.

Graphics Converter converts *Print Master* or *Print Shop* graphics to GEOS format, saving them as photo scraps. This way you can include your artwork on Photo Manager, GeoWrite, GeoPaint, or any other application that supports graphics.

Typing It In

Graphics Converter is written entirely in machine language. To enter it, you'll need to use *MLX*, our machine language entry program (see "Typing Aids" elsewhere in this section). When *MLX* prompts you, respond with the values given below.

Starting address: 0247

Ending address: 09BE

When you've finished typing, be sure to save two copies of the program to a GEOS work disk before exiting *MLX*. One copy will be converted by *GeoConverter 2.0* ("The GEOS Column," *COMPUTE!'s Gazette*, March 1990) into a GEOS desk accessory. The other is a backup copy in case you have a problem with the conversion.

If you don't already have a copy of *GeoConverter*, we have included the program listing here. Be sure to use *The Automatic Proofreader* (again, see "Typing Aids") to prevent typing mistakes when you enter the program. Save a copy of *GeoConverter* to the disk that contains *Graphics Converter*.

To prepare *Graphics Converter* for use with GEOS, load and run *GeoConverter*. When prompted for a filename, enter the name you used to save *Graphics Converter*. *GeoConverter* then converts the file into a GEOS desk accessory.

Using the Program

To use *Graphics Converter* from GEOS, just double-click on its icon. Since *Graphics Converter* is an application, the screen will change, and a menu will appear. From the GEOS menu you can select several options, as explained below.

Graphics Info

Graphics Info contains a dialog box with information about the author and the program's version number. This dialog box also contains a copyright message.

GRAPHICS CONVERTER

CONVERT PRINT
MASTER AND THE
PRINT SHOP
GRAPHICS FOR
USE WITH GEOS
WITH THIS UTILITY
FOR THE 64

Photo Manager

After you have converted a graphic to the GEOS format, paste it in the Photo Manager and continue converting graphics until you've finished with all of them. If the Photo Manager is not on your disk or if there is insufficient disk space to use the Photo Manager, a dialog box containing an error message will appear onscreen. If you are sure Photo Manager is on disk and the dialog box still appears, you'll have to remove or delete files to make room on your disk before continuing.

File

If you want to convert a *Print Master* graphic, click on that name from the File menu. The program will search on the disk immediately after you select this option, so your data disk with your *Print Master* graphics must be in the drive. *Graphics Converter* will make a list of files that are three blocks long and end with .GRA. A list of these graphics will appear on a dialog box. You can choose the graphic you want by moving a rectangle with the up and down arrows. To load and display the graphic, click on the OK icon. Otherwise, click on the Cancel icon, which will cause the dialog box to disappear without making any changes. After you've clicked on the graphics you want to convert, close the file and move to the Convert menu.

Converting *Print Shop* graphics works in a similar manner. *Graphics Converter* will make a list of *Print Shop* files and display it on the screen. The only difference is that the list will consist of any two-block files, regardless of the filename. Select graphics for conversion in the same manner as explained above.

Quit

Once you have converted all the files you want and have pasted them in an album, select the Quit option to exit to the Desktop.

Convert

Once the graphic has been loaded and displayed on the screen, select the Convert option. *Graphics Converter* will save the graphic to disk as a GEOS photo scrap. The disk in the drive must be a GEOS disk; otherwise an error message will appear. Don't worry if that should happen; just change disks and try again.

Select

If you want to convert more than one graphic, you don't have to click on the File menu and then return to the *Print Shop* or *Print Master* option each time. You need only to click on the



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Select option, and a list corresponding to your last selection will be displayed on the screen. If the last converted file was from *Print Master* (the default format), the list will contain *Print Master* graphic files. Just be sure your data disk is still in the disk drive before you click on the Select menu.

Error Messages

For all the possible errors that may occur, the onscreen messages are kept simple for maximum clarity. If you should get an error message during an operation, check the following table for more complete information.

Error Message	Possible Cause
Photo Manager	Photo Manager not on disk. Disk nearly full. No disk in drive. Write-protect tab on disk.
Print Master	No disk in drive.
Print Shop	No disk in drive.
Select	No disk in drive.
Convert	Non-GEOS disk. No disk in drive. Write-protect tab on disk. Disk nearly full.

GRAPHICS CONVERTER

0247:5D 03 15 BF 01 FF FF 02 63
024F:00 01 02 18 71 02 28 09 42
0257:02 08 31 02 08 09 7E 1D 23
025F:71 80 00 01 80 06 01 80 EA
0267:0F 15 85 46 29 82 89 15 C8
026F:85 56 A9 9F E9 F9 84 00 3B
0277:21 84 00 21 87 FF E1 84 C3
027F:00 21 84 00 21 80 00 01 68
0287:FF FF FF 83 06 00 00 04 F7
028F:A6 0B 00 04 47 45 4F 43 1B
0297:4F 4E 56 45 52 54 45 52 B6
029F:56 31 2E 30 00 00 00 00 E3
02A7:46 43 4F 2E 20 46 45 4C 5D
02AF:49 58 20 48 45 52 52 45 54
02B7:52 41 5D 8D 00 00 A9 14 21
02BF:20 39 C1 20 9F C1 00 C7 28
02C7:00 00 3F 01 20 4B C1 A9 1F
02CF:1F 85 02 A9 04 85 03 A9 85
02D7:00 20 51 C1 60 00 0E 00 49
02DF:00 84 00 04 02 09 80 3B B5
02E7:04 07 09 80 4D 04 0C 09 74
02EF:00 BC 04 13 09 00 2A 08 79
02FF:00 0E 2A 00 00 55 00 82 9C
02FF:1B 85 02 A9 04 85 03 A9 85
0307:78 04 00 0E 38 1D 00 66 C7
030F:00 83 36 09 00 C8 04 43 BB
0317:09 00 CC 04 4E 09 00 64 76
031F:04 00 4C 2C 20 90 C1 EC
0327:A9 53 85 02 A9 09 85 03 27
032F:20 56 C2 4C 0E 04 20 90 49
0337:C1 20 A1 C2 20 E1 C1 A9 3C

033F:71 85 0E A9 09 85 0F 20 58
0347:0B C2 8A D0 1F A9 00 85 07
034F:14 A9 84 85 15 20 17 C2 CC
0357:8A D0 11 20 9F C1 18 9B CA
035F:14 00 18 01 A9 00 8D 56 41
0367:0A 4C 0E 04 A9 61 85 02 67
036F:A9 09 85 03 20 56 C2 4C 99
0377:0E 04 20 93 C1 20 A1 C2 57
037F:8A D0 E9 4C E2 04 A9 00 7B
0387:F0 02 A9 01 8D 4B 0A 20 99
038F:90 C1 20 A1 C2 8A D0 D4 23
0397:AD 52 0A CD 4B 0A D0 13 5E
039F:A0 00 B9 00 3F D9 00 82 35
03A7:D0 09 C8 98 C9 AB D0 F2 8C
03AF:4C E5 05 AD 4B 0A 8D 52 C0
03B7:0A A9 00 85 05 85 0A A9 81
03BF:3F 85 0B A9 12 85 04 20 91
03C7:E4 C1 8A D0 9F A9 00 8D 40
03CF:4C 0A 8D 4D 0A A9 01 85 C4
03D7:FD A9 0B 85 FE A9 12 A2 66
03DF:01 8E 51 0A 85 04 86 05 23
03E7:A9 00 85 FB 85 0A A9 80 5B
03EF:85 FC 85 0B 20 E4 C1 8A FB
03F7:F0 03 4C AE 04 20 5E 05 0E
03FF:18 A5 FB 69 20 85 FB 90 31
0407:F4 AE 01 80 AD 00 80 D0 9C
040F:D3 A9 A6 85 FB A9 0B 85 BA
0417:FC 4C E5 05 AD 4B 0A D0 3D
041F:47 A0 02 B1 FB F0 31 C8 1D
0427:B1 FB F0 2C A0 1F B1 FB C8
042F:D0 26 88 B1 FB C9 03 D0 33
0437:1F 20 9B 05 88 B1 FB C9 67
043F:41 D0 15 88 B1 FB C9 52 AA
0447:D0 0E 88 B1 FB C9 47 D0 CD
044F:07 88 B1 FB C9 2E F0 2B 07
0457:60 A0 15 88 B1 FB C9 A0 94
045F:F0 F9 C8 A9 00 91 FB 60 B0
0467:A0 02 B1 FB F0 34 C8 B1 D1
046F:FB F0 2F A0 1F B1 FB D0 2A
0477:29 88 B1 FB C9 02 A0 22 46
047F:20 9B 05 EE 4C 0A D0 05 DE
0487:B1 FB 91 FD C8 C0 14 D0 BB
048F:F7 A9 00 91 FD 18 A5 FD B0
0497:69 10 85 FD A5 FE 69 00 E4
049F:85 FE 60 A9 36 85 02 A9 46
04A7:0A 85 03 20 56 C2 C6 02 C5
04AF:F0 03 4C 0E 04 AD 4C 0A D4
04B7:F0 F8 AD 4D 5D 05 00 0A 0A
04BF:18 65 FB 85 FD A5 FC 69 EE
04C7:00 85 FE A5 FD 85 0E A5 33
04CF:FE 85 0F 20 0B C2 8A D0 E5
04D7:54 A9 00 85 06 AD 01 84 3A
04DF:85 04 A9 80 85 10 A9 40 E8
04E7:85 11 AD 02 84 85 05 A9 BA
04EF:03 85 07 20 FF C1 8A D0 AA
04F7:34 AE 4B 0A CA 8A F0 30 62
04FF:20 A2 C1 2A 60 2F 00 88 E3
0507:00 FF A9 0B 85 06 A9 34 C2
050F:85 07 A9 87 85 02 A9 06 D8
0517:85 04 A9 2B 85 05 A9 40 A0
051F:85 03 20 42 C1 A9 01 8D 19
0527:56 0A 4C 0E 04 4C AE 04 FB
052F:A5 FB 8D 53 0A A5 FC 8D 60
0537:54 0A A9 00 85 FD A9 44 DE
053F:85 FE A9 82 85 FB A9 40 D8
0547:85 FC A2 2D A0 00 A9 86 59
054F:91 FD 20 E7 06 A9 00 8D 88
0557:55 0A B1 FB 91 FD 20 E1 2B
055F:06 EE 55 0A AD 55 0A C9 14
0567:06 D0 EF CA D0 E0 20 EE 8C
056F:06 A9 06 85 06 A9 2D 85 B6
0577:07 A9 00 85 02 A9 44 85 8C
057F:03 AD 53 0A 85 FB AD 54 4D
0587:0A 85 FC A9 02 85 04 A9 2A
058F:2B 85 05 20 42 C1 A9 01 A0
0597:8D 56 0A 4C 0E 04 E6 FB 4E

059F:D0 02 E6 FC E6 FD D0 02 12
05A7:E6 FE 60 A9 14 20 39 C1 E0
05AF:20 9F C1 28 64 2D 00 89 CD
05B7:00 20 A2 C1 2A 58 2F 00 4B
05BF:60 00 FF 60 20 A2 C1 23 32
05C7:7D 37 00 96 00 FF 20 AB B3
05CF:C1 63 0A 14 46 02 10 A9 1A
05D7:00 85 19 A9 A7 85 18 A0 25
05DF:52 38 20 4E C1 4C A4 07 99
05E7:AD 05 85 29 80 D0 4D A5 D4
05EF:3A C9 A0 90 47 C9 AF B0 18
05F7:43 A5 3C C9 46 90 3D C9 E9
05FF:56 B0 39 C9 4E 90 36 AD F3
0607:4D 0A C9 05 F0 13 AE 4C 43
060F:0A CA 8A CD 4D 0A F0 24 99
0617:EE 4D 0A EE 51 0A 4C A4 0E
061F:07 AD 4C 0A CD 51 0A F0 FC
0627:13 18 A5 FB 69 10 85 FB C9
062F:A5 FC 69 00 85 FC EE 51 C9
0637:0A 4C A4 07 60 AD 4D 0A BE
063F:F0 09 CE 4D 0A CE 51 0A EC
0647:4C A4 07 AE 51 0A CA F0 A7
064F:EB 38 A5 FB E9 10 85 FB 6A
0657:A5 FC E9 00 85 FC CE 51 C1
065F:0A AD 4C 0A F0 D6 A9 00 3C
0667:8D 4F 0A 20 39 C1 20 9F 02
066F:C1 24 7C 38 00 95 00 A9 78
0677:2E 8D 50 0A A5 FB 85 FD CE
067F:A5 FC 85 FE A5 FD 85 02 70
0687:A5 FE 85 03 A9 00 85 19 78
068F:85 04 A9 38 85 18 AD 50 50
0697:0A 85 05 20 48 C1 18 AD D3
069F:50 0A 69 0F 8D 50 0A 18 4E
06A7:A5 FD 69 10 85 FD A5 FE A2
06AF:69 00 85 FE EE 4F 0A AD 87
06B7:4F 0A CD 4C 0A F0 07 C9 58
06BF:06 F0 03 4C C7 07 AD 4D 33
06C7:0A 0A A8 B9 57 0A 85 06 FF
06CF:B9 58 0A 85 07 A9 00 85 CC
06D7:09 85 0B A9 38 85 08 A9 57
06DF:95 85 0A 20 2A C1 60 20 94
06E7:93 C1 20 5B 08 20 A1 C2 AE
06EF:AD 8B 84 D0 03 4C AE 04 FD
06F7:A9 7F 85 02 A9 09 85 03 00
06FF:20 38 C2 A9 9A 85 14 A9 D9
0707:0A 85 15 A9 00 85 16 20 1B
070F:ED C1 8A D0 E0 4C 0E 04 3B
0717:AD 56 0A D0 05 68 68 4C C6
071F:0E 04 AD 4B 0A D0 56 A9 89
0727:00 8D 86 40 A9 38 8D 85 3C
072F:40 A9 0B 8D 84 40 A9 84 FE
0737:8D E1 0A A9 40 8D E2 0A 68
073F:A5 FB 8D 53 0A A5 FC 8D 74
0747:54 0A A9 0D 8D E3 0A A9 C1
074F:43 8D E4 0A A9 F7 85 FD D5
0757:A9 42 85 0E A9 84 85 FB D1
075F:A9 0A 85 FC A2 16 A0 00 F3
0767:B1 FB 91 FD 20 E1 06 CA 9A
076F:D0 F6 AD 53 0A 85 FB AD BE
0777:54 0A 85 FC 60 A9 00 8D E9
077F:FF 43 A9 2D 8D FE 43 A9 FE
0787:06 8D FD 4D A9 FD 8D E1 32
078F:0A A9 43 8D E2 0A A0 00 CE
0797:A9 06 91 FD 20 E7 06 A9 64
079F:00 91 FD 20 E7 06 A9 24 A2
07A7:91 FD 20 E7 06 A9 BF 91 68
07AF:FD 20 E7 06 A5 FD 8D E3 46
07B7:0A A5 FE 8D E4 0A 60 47 44
07BF:45 4F 53 00 46 49 4C 45 E3
07C7:00 53 45 4C 45 43 54 00 F7
07CF:43 4F 4E 56 45 52 54 00 9E
07D7:43 4F 4E 56 45 52 54 20 C6
07DF:49 4E 46 4F 00 50 48 4F 05
07E7:54 4F 20 4D 41 4E 41 47 D9
07EF:45 52 00 50 52 49 4E 54 E2
07F7:20 4D 41 53 54 45 52 00 23



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07FF:50 52 49 4E 54 20 53 48 EA
0807:4F 50 00 51 55 49 54 00 60
080F:01 1E 82 32 00 FF 00 0B A5
0817:17 12 8B 09 0E 00 01 1E C9
081F:82 32 00 FF 00 0B 14 12 63
0827:09 0A 01 13 4C 00 70 68 3B
082F:6F 74 6F 20 6D 61 6E 61 33
0837:67 65 72 00 50 68 6F 74 1A
083F:6F 20 53 63 72 61 70 00 A9
0847:1A 47 52 41 50 48 49 43 0E
084F:53 20 43 4F 4E 56 45 52 17
0857:54 45 52 20 D6 31 2E 33 3A
085F:1B 18 16 8E 00 3E 42 59 85
0867:16 6B 00 4D 1B 18 C6 D2 CB
086F:C1 CE C3 C9 D3 C3 CF A0 17
0877:C6 C5 CC C9 D8 16 5F 00 70
087F:67 1B 43 4F 50 59 52 49 3D
0887:47 48 54 20 31 39 39 30 EA
088F:20 43 4F 4D 50 55 54 45 05
0897:21 16 41 00 71 1B 50 55 D3
089F:42 4C 49 43 41 54 49 4F 7E
08A7:4E 53 2C 20 49 4E 43 2E 73
08AF:20 41 4C 4C 20 52 49 47 92
08B7:48 54 53 20 52 45 53 45 01
08BF:52 56 45 44 2E 00 18 43 60
08C7:41 4E 20 4E 4F 54 20 43 44
08CF:4F 4E 54 49 4E 55 45 2C B8
08D7:20 41 4E 20 45 52 52 4F 7B
08DF:52 16 6F 00 3C 48 41 53 65
08EF:20 4F 43 55 52 52 45 44 44
08FF:2E 1B 00 01 1E 82 32 00 4D
08F7:F0 00 01 11 0F 02 11 41 95
08FF:13 07 07 11 2B 07 5D 07 84
0907:00 00 24 5D 06 00 00 24 C7
090F:31 32 40 41 4F 50 5E 5F 3A
0917:6D 6E 7C A0 FF FF 80 01 17
091F:81 81 83 C1 87 E1 9F 9F DB
0927:BF FD 83 C1 83 C1 BF FD C5
092F:9F F9 87 E1 83 C1 81 81 46
0937:80 01 FF FF 0B 0B 00 00 38
093F:0B 00 0B 00 0B BF 0B BF 65
0947:0B BF 0B BF 0B BF 0B BF 59
094F:0B BF 7F 09 03 15 BF FF 43
0957:FF FF 80 40 01 80 60 01 49
095F:80 60 01 80 60 0D 80 50 7A
0967:35 80 50 D9 80 53 21 80 EF
096F:5C C1 80 59 01 87 CE 01 8A
0977:9F C8 01 B8 F8 01 B1 FC 63
097F:01 BF 6E 01 9C 66 01 80 E0
0987:66 01 80 6C 01 80 38 01 5F
098F:80 00 01 FF FF FF 83 04 0D
0997:5D 07 00 50 60 68 6F 74 91
099F:6F 20 53 63 72 61 70 20 2C
09A7:56 31 2E 31 00 00 00 00 0A
09AF:50 68 6F 74 6F 20 53 63 3F
09B7:72 61 70 5D A1 00 00 00 4C

```

GEOCONVERTER

```

DB 10 REM COPYRIGHT 1991 COMPU
TE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
SE 20 IF (PEEK(772)+PEEK(773)*2
56)=42364 THEN 40
PD 30 LIST0,1:LIST4,1:LIST6,1:
SA=PEEK(4625)*256+PEEK(4
624):GOTO50
SX 40 POKE56,PEEK(46)+40:CLR:P
OKE53280,0:POKE53281,0:S
A=PEEK(56)*256+PEEK(55)
FA 50 PRINT "{CLR}{8}{N}{DOWN}"
TAB(12)"{RVS}GEOCONVERTE
R 2.0{OFF}{GRN}{3 DOWN}"
:PRINTTAB(13)"COPYRIGHT
{SPACE}1991{DOWN}"
JR 60 PRINTTAB(4)"COMPUTE PUBL

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ICATIONS INTL LTD{DOWN}"
JK 65 PRINTTAB(11)"ALL RIGHTS
{SPACE}RESERVED{2 DOWN}"
MK 70 N=8:PRINT"DRIVE NUMBER "
N"{4 LEFT}";:INPUTN:IFN<
8ORN>11 THEN 70
QE 80 K$="N":PRINT"IS DRIVE"N
A 1581? "K$"{3 LEFT}";:I
NPUTK$:IFK$<>"N"ANDK$<>"
Y"THEN 80
SB 90 T$=CHR$(18):S$=CHR$(1):I
FK$="Y"THEN T$=CHR$(40):S
$=CHR$(3)
RS 100 INPUT"FILE TO CONVERT";
NMS:OPEN15,N,15:OPEN1,N
,8,"0:"+"NMS+",P,R"
BX 110 GOSUB440:IFEN<>0 THEN PRI
NT"{RVS}"EN$ "EM$ET$EE
$:GOTO400
FF 120 GET#1,K$,V$:IFK$<>CHR$(
71)ORV$<>CHR$(2) THEN CLO
SE1:CLOSE15:GOTO220
BR 130 PRINT"{DOWN}DECOMPRESSI
NG..." :Z$=CHR$(0):GET#1
,ESC$:ESC=ASC(ESC$+Z$):
AD=SA
RQ 140 GOSUB170:IFV<>ESCTHEN PO
KEAD,V:AD=AD+1:GOTO140
PP 150 GOSUB170:CT=V:GOSUB170:
CT=CT+V*256:GOSUB170:GO
SUB160:GOTO140
DH 160 FORI=1 TO CT:POKEAD,V:AD=
AD+1:NEXTI:CT=0:RETURN
PK 170 GET#1,V$:S=ST:V=ASC(V$+
Z$):IFST=0 THEN RETURN
SJ 180 IFS<>64 THEN GOSUB440:PRI
NT"{DOWN}LOAD ERROR -
{RVS}"EN$ "EM$ET$EE$:G
OTO400
AF 190 IFCT<>0 THEN GOSUB160:AD=
AD-1
DG 200 PRINT"{DOWN}WRITING..."
:CLOSE1:PRINT#15,"S0:"+"
NMS:CLOSE15
EF 210 OPEN1,N,8,"0:"+"NMS+",P,
W":FORI=SATOAD:PRINT#1,
CHR$(PEEK(I));:NEXTI:CL
OSE1
GP 220 PRINT"{DOWN}CONVERTING.
.." :HD$="":FORI=1 TO 4:RE
ADHE:HD$=HD$+CHR$(HE):N
EXTI
CF 230 FORI=1 TO 5:READIE:ID$=ID
$+CHR$(IE):NEXTI
DR 240 NL$="":OPEN15,N,15,"I0:
":OPEN2,N,2,"#"
MM 250 GOSUB410:GET #2,NT$,NS$
:FORI=0 TO 7:D$=NL$:GET#2
,B$:I=1:IFB$=NL$ THEN 310
PE 260 IF ASC(B$)<>130 THEN 310
AE 270 GET#2,HT$,HS$:I=3:IFHS$
=" " THEN HS$=CHR$(0)
DJ 280 GET#2,B$:I=I+1:IFB$=" " T
HEN B$=CHR$(0)
BM 290 IF (ASC(B$)=160) OR (I=19)
THEN 310
SF 300 D$=D$+B$:GOTO280
EB 310 FORI=1 TO 31:GET#2,B$:NEX
TI:IFD$=NM$ THEN 340
JX 320 NEXTE:IFNT$=NL$ THEN 340
CH 330 T$=NT$:S$=NS$:GOTO250
GA 340 IFD$=NL$ THEN PRINT"
{DOWN}DISK ERROR!":GOTO
400

```

```

PD 350 DT$=T$:S$=S$:T$=HT$:S$
=HS$:GOSUB410:GET#2,MT$
,MSS:IFMSS$=" " THEN MSS$=CH
R$(0)
GF 360 FORI=0 TO 65:GET#2,B$:NEX
TI:GET#2,CT$,GT$:GOSUB4
10:PRINT#2,HD$;:GOSUB42
0
RX 370 T$=DT$:S$=S$:GOSUB410:
FORI=1 TO 32*E+2:GET#2,B$
:NEXTI:PRINT#2,CT$;MT$;
MSS;
MB 380 FORI=0 TO 15:GET#2,B$:NEX
TI:PRINT#2,HT$;HS$;CHR$
(0);GT$;ID$;:GOSUB420
GR 390 PRINTNM$ " CONVERTED!"
HB 400 CLOSE1:CLOSE2:CLOSE15:E
ND
DQ 410 U$="U1":GOTO430
CS 420 U$="U2"
PA 430 PRINT#15,U$;2;0;ASC(T$+
"0");ASC(S$+"0"):RETURN
JJ 440 INPUT#15,EN,EM$,ET,EE:E
N$=STR$(EN):ET$=STR$(ET
):EE$=STR$(EE):RETURN
EH 450 DATA 0,255,3,21,87,10,1
,0,0

```

TYPING AIDS

MLX, the machine language entry program for the 64 and 128, and *The Automatic Proofreader* are utilities that help you type in Gazette programs without making mistakes. These labor-saving utilities are on each *Gazette Disk* and printed in issues of *Gazette* through June 1990.

If you don't have access to a back issue or to one of our disks, write and we'll send you free copies of both of these handy utilities. We'll also include instructions on how to type in Gazette programs. Please enclose a self-addressed, stamped envelope.

Write to Typing Aids, COM-PUTER's Gazette, 324 West Wendo-ver Avenue, Greensboro, North Carolina 27408.



PROGRAMS

R I C H A R D P E N N

With computers, often the more colors you can use, the better your graphics look. Unfortunately, you can only have three colors per character with the 64's multicolor mode, which consequently limits many special effects.

Raster interrupts can soup up text with a vertical four-color fading effect. While this is an improvement, it still leaves much to be desired. Characters are seven lines high, and ordinary interrupts are only fast enough to change colors every two lines.

Metallix provides a new graphics mode that displays seven colors per character—an independent hue on each raster line. This is the best vertical color resolution possible on the 64. The extra colors make metallic shading possible, giving your text a metallic luster. These enhanced metallic screens can be faded in and out for more eye-catching effects. Even sprites can be displayed with them. Through an innovative raster programming approach, *Metallix* truly gives 64 graphics an exciting new look. A self-running demo is included. (Note that a good, properly adjusted color monitor is required to clearly display *Metallix* colors.)

Getting Started

Metallix consists of two programs, both written in BASIC. Enter them using *The Automatic Proofreader* (see "Typing Aids" elsewhere in this section). The first program generates the actual machine language routine and saves it to disk as METALLIX.OBJ. Type it in and save it as METALLIX.ML MAKE and then run it. You only need to run this program once to create the METALLIX.OBJ file.

The second program is a demo that shows how to use *Metallix*. After you've typed it in, save it as METALLIX.DEMO to the same disk with METALLIX.OBJ. When you run the demo, it will automatically load and run METALLIX.OBJ. To use *Metallix* in your own programs, add line 30 of the demo program to the beginning of your BASIC programs.

Two Commands

Accessing *Metallix*'s features is easy, since you only need to learn two SYS commands to use it with your BASIC programs. The first command is SYS 51720, *border, background*. It clears the screen, selects the border and background colors (0-15), and fills the screen with reversed spaces. This command must be called before you print to the screen. It also changes the cursor color to the background color, so anything you print will be invisible. The only thing to remember while designing your displays is to avoid the leftmost three columns and to print everything in reverse field.

METALLIX

SEVEN COLORS PER
CHARACTER ARE
POSSIBLE WITH THIS
EXCITING
PROGRAMMING
UTILITY FOR THE 64

When you're ready to display a screen, use the command SYS 51890, *c1, c2, c3, c4, c5, c6, c7, [duration]*. This command selects the seven character-shading colors (0-15) from top to bottom and fades a screen into view. Below are the three metallic shades used in the demo:

```
SYS 51890,11,15,1,7,10,8,2
SYS 51890,12,15,1,7,10,8,2
SYS 51890,15,1,7,10,8,2,9
```

The last parameter is optional; it selects the length of time the screen remains on before it is faded off (0-255). If omitted, a screen will remain visible until you press the space

bar. Note that displaying a *Metallix* screen takes all of the computer's attention, so a BASIC program cannot continue until the screen has been turned off. More on this later.

As mentioned earlier, *Metallix* graphics can be combined with sprites if you follow some guidelines. The best way to use sprites and metallic text together is to set up a split screen where sprites and text are separate, as in the demo. Text can be placed beside sprites, but it must be on the rightmost side of the screen because the shading on the left will be distorted. Also, avoid placing sprites too high on the screen and placing too many on a single horizontal line, since doing this could slow *Metallix* down. Displaying sprites and text side by side is best done by trial and error.

When Longer Is Faster

Ordinary raster interrupts involve some overhead time. Of course, we're talking milliseconds here, but at the lightning speeds of a video display, these minuscule times become significant. Consequently, regular interrupts are too slow to interrupt at the beginning of every raster line.

Programmers know how to efficiently use loops to make the computer do more with less code. If you want to fill the screen with spaces, you don't print each space separately. If you did, you would need 1000 print statements. Instead, you write a one-line loop to do it. When writing *Metallix*, however, I did what programmers are never supposed to do. I wrote 1000 print statements—well, more like 200 raster comparisons and color changes.

There's a reason for this unorthodox coding. Even machine language instructions take time to execute. To have the 64 run fast enough to change colors on every raster line, I had to eliminate all unnecessary instructions.

A machine language loop chasing the raster is too slow because it must update a pointer and branch back. With 200 color changes arranged sequentially, there is no time-consuming



PROGRAMS

looping. The program falls through to the next instruction in a straight line, and hence executes at the fastest possible speed (of course, you don't have to type in all 200 color changes, the machine language-maker program generates them for you with a loop).

METALLIX

```
DB 10 REM COPYRIGHT 1991 COMPU
TE PUBLICATIONS INTL LTD
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EH 20 PRINT"[CLR]GENERATING ME
TALLIX ML..."
SP 30 POKE49152,120:POKE49153,
162:POKE49154,12:POKE491
55,160:POKE49156,12
MA 40 X=49157
PC 50 FORT=50TO249
QS 60 POKE X,173:POKE X+1,18:POK
EX+2,208
FC 70 POKE X+3,201:POKE X+4,T
MC 80 POKE X+5,208:POKE X+6,249
FH 90 POKE X+7,142:POKE X+8,33:P
OKE X+9,208:T=T+1
GX 100 POKE X+10,173:POKE X+11,1
8:POKE X+12,208
EM 110 POKE X+13,201:POKE X+14,T
CP 120 POKE X+15,208:POKE X+16,2
49
KC 130 POKE X+17,140:POKE X+18,3
3:POKE X+19,208:T=T+1:X=
X+20
AJ 140 FOR L=1TO6:POKE X,173:POK
EX+1,18:POKE X+2,208
SR 150 READ C:IF C=-1 THEN RESTORE
:READ C
XJ 160 POKE X+3,201:POKE X+4,T:P
OKE X+5,208:POKE X+6,249
BH 170 POKE X+7,169:POKE X+8,C
BX 180 POKE X+9,141:POKE X+10,33
:POKE X+11,208:T=T+1:X=X
+12:NEXT
HJ 190 T=T-1:NEXT
HH 200 DATA 15,1,7,10,8,2,-1
JS 210 READ X:FOR U=51457TO52120
:READ Q:POKE U,Q:CK=CK+Q:
NEXT
XS 220 IF CK<>91398 THEN PRINT"ER
ROR IN DATA":STOP
ME 230 PRINT"[DOWN]WRITING MET
ALLIX.OBJ FILE TO DISK.
..."
RC 240 SYS57812"METALLIX.OBJ",
8,1:POKE193,0:POKE194,1
92:POKE174,153:POKE175,
203
PJ 250 SYS62957
DR 260 DATA 76,154,201,173,134,
203,201,1,240,56,201,2,
240,107,173,18,208,201
JA 270 DATA 251,208,249,169,6,1
41,33,208,173,18,208,20
1,15,208,249,173,18,208
HG 280 DATA 201,14,208,249,238,
135,203,173,135,203,201
,1,240,3,76,5,192,169
BS 290 DATA 141,134,203,169,0
,141,135,203,76,5,192,1
73,18,208,201,251,208
FR 300 DATA 249,173,18,208,201,
```

```
15,208,249,238,135,203,
173,135,203,201,2,240,3
MJ 310 DATA 76,5,192,169,2,141,
134,203,169,0,141,135,2
03,169,21,141,24,208
SF 320 DATA 169,122,141,2,201,1
69,201,141,3,201,76,5,1
92,173,18,208,201,251
QR 330 DATA 208,249,76,110,203,
201,239,240,3,76,5,192,
169,29,141,24,208,169
DE 340 DATA 154,141,2,201,169,2
01,76,147,203,173,134,2
03,201,1,240,44,201,0
CM 350 DATA 240,92,173,18,208,2
01,251,208,249,173,18,2
08,201,15,208,249,238,1
35
HB 360 DATA 203,173,135,203,201
,2,240,3,76,5,192,169,1
,141,134,203,169,0
QG 370 DATA 141,135,203,76,5,19
2,173,18,208,201,251,20
8,249,169,6,141,33,208
BM 380 DATA 173,18,208,201,15,2
08,249,173,18,208,201,1
4,208,249,238,135,203,1
73
RQ 390 DATA 135,203,201,1,240,3
,76,5,192,169,0,141,134
,203,169,0,141,135
BS 400 DATA 203,76,5,192,169,0,
141,33,208,88,96,162,26
,181,216,9,128,149
CF 410 DATA 216,202,208,247,173
,18,208,201,12,208,249,
32,155,183,142,32,208,1
69
GP 420 DATA 27,141,17,208,32,15
5,183,142,33,208,142,13
4,2,138,160,251,153,255
XM 430 DATA 215,153,249,216,153
,243,217,153,237,218,13
6,208,241,169,160,160,2
51,153
PF 440 DATA 255,3,153,249,4,153
,243,5,153,237,6,136,20
8,241,169,18,133,199
DJ 450 DATA 169,0,141,14,220,16
9,51,133,1,162,16,160,2
55,169,0,133,90,169
JX 460 DATA 223,133,91,169,0,13
3,88,169,63,133,89,32,2
36,163,169,55,133,1
FG 470 DATA 169,1,141,14,220,16
2,0,189,0,48,41,170,141
,136,203,169,255,56
KK 480 DATA 237,136,203,157,0,5
2,189,0,49,41,170,141,1
36,203,169,255,56,237
KC 490 DATA 136,203,157,0,53,23
2,208,219,169,29,141,24
,208,169,27,141,17,208
KD 500 DATA 96,160,0,140,137,20
3,32,155,183,138,172,13
7,203,153,138,203,200,1
92
PS 510 DATA 7,208,238,169,4,141
,2,201,169,201,141,3,20
1,169,173,141,129,201
HD 520 DATA 169,1,141,130,201,1
69,220,141,131,201,169,
29,141,24,208,169,0,141
```

```
GB 530 DATA 134,203,141,135,203
,169,5,141,145,203,169,
1,141,48,201,141,238,20
1
RP 540 DATA 169,2,141,88,201,14
1,186,201,169,33,133,25
1,169,192,133,252,173,1
38
FD 550 DATA 203,141,2,192,141,4
,192,162,25,160,0,173,1
39,203,145,251,200,24
SH 560 DATA 165,251,105,12,133,
251,165,252,105,0,133,2
52,185,139,203,140,137,
203
FF 570 DATA 160,0,145,251,172,1
37,203,200,192,6,208,22
5,24,165,251,105,32,133
GK 580 DATA 251,165,252,105,0,1
33,252,202,208,201,169,
44,160,0,209,122,240,3
HK 590 DATA 76,0,192,169,76,141
,129,201,169,110,141,13
0,201,169,203,141,131,2
01
KA 600 DATA 32,155,183,142,146,
203,76,0,192,206,145,20
3,240,3,76,5,192,206
KA 610 DATA 146,203,240,8,169,5
,141,145,203,76,5,192,7
6,139,201,0,0,0
XG 620 DATA 5,11,15,1,7,10,8,2,
0,0,141,3,201,76,5,192
```

METALLIX.DEMO

```
DB 10 REM COPYRIGHT 1991 COMPU
TE PUBLICATIONS INTL LTD
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HS 20 POKE53280,0:POKE53281,0:
PRINT"[CLR]{9 DOWN}{RED}
"TAB(9)"LOADING METALLIX
..."
GB 30 POKE147,0:SYS57812"METAL
LIX.OBJ",8,1:SYS62631
FJ 40 FORT=8192TO8320:READ X:PO
KET,X:NEXT
GM 50 V=53248:POKE V+23,255:POK
EV+29,0:POKE V+28,255
AP 60 FORT=V+39TOV+46:POKET,15
:NEXT:POKE V+37,12:POKE V+
38,11
AQ 70 X=139:FORT=VTOV+6STEP2:P
OKET,X:X=X+24:NEXT
BH 80 X=139:FORT=V+8TOV+14STEP
2:POKET,X:X=X+24:NEXT
QS 90 FORT=V+1TOV+7STEP2:POKET
,63:NEXT:FORT=V+9TOV+15S
TEP2:POKET,105:NEXT
DJ 100 FORT=2040TO2046STEP2:PO
KET,128:NEXT:FORT=2041T
O2047STEP2:POKET,129:NE
XT
SM 110 C1=11:C2=15:C3=1:C4=7:C
5=10:C6=8:C7=2
MK 120 SYS51720,0,0:POKE53265,
11:FORDL=1TO1000:NEXT:P
OKE V+21,255:FORD=1TO10:
NEXT
QX 130 POKE53265,27:PRINT"
{HOME}{15 DOWN}"TAB(13)
"{RVS}M E T A L L I X"
KD 140 PRINT"[2 DOWN]"
```


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PROGRAMS

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      {SPACE}LTD":GOSUB501
XP 150 A$="{RVS}ALL RIGHTS RES
      ERVED":GOSUB501
XM 160 SYS51890,C1,C2,C3,C4,C5
      ,C6,C7,20:SYS51720,0,0:
      GOSUB520
CF 170 PRINT "{HOME}"TAB(2) "
      {16 DOWN}{RVS}ADD A MET
      ALLIC LUSTER TO YOUR VI
      DEO"
HA 180 PRINTTAB(2) "{RVS}{DOWN}
      WITH THIS ELITE METAL S
      HADING EFFECT"
JB 190 SYS51890,C1,C2,C3,C4,C5
      ,C6,C7,50:SYS51720,0,0:
      GOSUB520
CG 200 PRINT "{HOME}"TAB(3) "
      {15 DOWN}{RVS}THIS NEW
      {SPACE}GRAPHICS MODE DI
      SPLAYS A"
HX 210 PRINTTAB(3) "{DOWN}{RVS}
      VERTICAL COLOR RESOLUTI
      ON OF SEVEN"
DP 220 PRINTTAB(2) "{DOWN}{RVS}
      COLORS PER CHARACTER, A
      N INDEPENDENT"
MD 230 PRINTTAB(1) "{DOWN}{RVS}
      HUE FOR EACH RASTER LIN
      E ON THE SCREEN!"
DX 240 SYS51890,C1,C2,C3,C4,C5
      ,C6,C7,50:SYS51720,0,0:
      GOSUB520
FS 250 PRINT "{HOME}"TAB(10) "
      {15 DOWN}{RVS}DONE WITH
      INNOVATIVE"
DJ 260 PRINTTAB(7) "{DOWN}{RVS}
      RASTER PROGRAMMING, THI
      S IS"
ME 270 PRINTTAB(4) "{DOWN}{RVS}
      THE BEST VERTICAL COLOR
      RESOLUTION"
PA 280 PRINTTAB(11) "{DOWN}
      {RVS}POSSIBLE ON THE 64
      "
KH 290 SYS51890,C1,C2,C3,C4,C5
      ,C6,C7,50:SYS51720,0,0:
      GOSUB520:POKEV+21,255
BQ 300 PRINT "{HOME}"TAB(8) "
      {14 DOWN}{RVS}COMPLETE
      {SPACE}WITH A VIDEO FAD
      E"
ED 310 PRINTTAB(19) "{2 DOWN}
      {RVS}AND"
QB 320 PRINTTAB(10) "{2 DOWN}
      {RVS}COMBINED WITH SPRI
      TES"
AJ 330 PRINTTAB(5) "{DOWN}{RVS}
      64 GRAPHICS NEVER LOOKE
      D SO GOOD!"
QH 340 SYS51890,C1,C2,C3,C4,C5
      ,C6,C7,50:POKEV+21,0:SY
      S51720,0,0:GOSUB520
MR 350 PRINT "{HOME}"TAB(4) "
      {DOWN}{RVS}THE COMMANDS
      "
AD 360 PRINTTAB(4) "{2 DOWN}
      {RVS}SYS 51720,BORD,BAC
      K"
ED 370 PRINTTAB(6) "{DOWN}{RVS}
      CLEARS THE SCREEN AND S
      ETS THE"

```

```

HX 380 PRINTTAB(6) "{DOWN}{RVS}
      BORDER AND BACKGROUND C
      OLORS."
JX 390 PRINTTAB(4) "{3 DOWN}
      {RVS}SYS 51890,C1,C2,C3
      ,C4,C5,C6,C7,[DUR]"
CF 400 PRINTTAB(6) "{DOWN}{RVS}
      SELECTS THE 7 CHARACTER
      COLORS."
JJ 410 PRINTTAB(6) "{DOWN}{RVS}
      THE LAST PARAMETER IS O
      PTIONAL"
PH 420 PRINTTAB(6) "{DOWN}{RVS}
      AND SELECTS THE DISPLAY
      DURATION."
DJ 430 PRINTTAB(6) "{DOWN}{RVS}
      IF OMITTED THE DISPLAY
      {SPACE}IS"
XM 440 PRINTTAB(6) "{DOWN}{RVS}
      STOPPED WITH THE SPACE
      {SPACE}BAR."
HS 450 SYS51890,C1,C2,C3,C4,C5
      ,C6,C7,50:GOSUB520
MH 460 Z=2+1:IFZ>2THENZ=0
QA 470 IFZ=0THENCL=11:C2=15:C3
      =1:C4=7:C5=10:C6=8:C7=2
BC 480 IFZ=1THENCL=12:C2=15:C3
      =1:C4=7:C5=10:C6=8:C7=2
GE 490 IFZ=2THENCL=15:C2=1:C3=
      7:C4=10:C5=8:C6=2:C7=9
PP 500 SYS51720,0,0:POKEV+21,2
      55:GOTO130
RC 501 FOR XZ=1 TO (20-INT(LEN
      (A$)/2)):PRINT "{RVS} ";
      :NEXT:PRINTA$:RETURN
CF 510 REM DELAY SUB
DX 520 FORDL=1TO50:NEXT:RETURN
MC 530 REM SPRITE DATA
CP 540 DATA 42,170,170,37,85,87
      ,37,85,87,38,170,151,38
      ,170,183,38,170,183
EH 550 DATA 38,191,247,38,181,8
      7,38,181,87,38,170,87,3
      8,170,215,38,170,215
JR 560 DATA 38,191,215,38,181,8
      7,38,181,87,38,170,151,
      38,170,183,38,170,183
DM 570 DATA 37,255,247,37,85,87
      ,47,255,255,0,42,170,17
      0,37,85,87,37,85
JP 580 DATA 87,38,170,151,38,17
      0,183,38,170,183,38,170
      ,183,38,190,183,38,182
DG 590 DATA 183,38,182,183,38,1
      82,183,38,182,183,38,18
      2,183,38,182,183,38,182
MC 600 DATA 183,38,182,183,38,1
      82,183,37,245,247,37,85
      ,87,37,85,87,47,255
DR 610 DATA 255,42,64

```

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BX BASIC

Daryl "Beaux" Knowles

BX BASIC provides VIC-type graphics functions in 80-column mode. This extension to C-128 BASIC will get both the novice and the experienced programmer doing graphics in full 640 × 200 resolution within minutes. It also comes with extra features that support structured programming techniques, programming aids, and "blitter object" commands.

One outstanding feature of **BX BASIC** is a command that lets you use virtual sprites on an 80-column screen. A simple shape command allows easy formation of simple, regular 3-D polygons on the 80-column bitmap.

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